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Mechanical Stoking.

BY F. W. PARSONS.

Investigation shows that mechanical stoking, as compared with hand firing, will effect a saving in fuel bills of not less than 10 per cent. when conditions are unfavorable, the test being based upon the cost of evaporating a given weight of water by hand and by stoker firing. It is also proven that the capacity of the boilers can be increased at least 25 per cent. beyond rating; 10 sq.ft. of heating surface in water-tube boilers, or 12 sq.ft. of heating surface in return-tubular boilers to constitute one horse-power.

The saving in fuel will sometimes run as high as 40 per cent., depending largely on the competency of the firemen available in that especial locality.

If we assume the boiler efficiency under hand firing as 60 per cent. and the coal used as containing 10,500 B.t.u., we would then burn 5.3 lb. of coal per h.p. per hour. Estimating 10 hours to a day, and figuring on four 250-h.p. boilers, used to their full capacity, the daily coal consumption would be 53,000 lb., and if we consider a saving of 20 per cent. due to mechanical stoking, this would amount to 5.3 tons per day of 10 hours. What this saving is in dollars and cents can be readily determined when we know how much the coal costs per ton delivered at the boilers. That a saving of 20 per cent. in fuel is not unreasonable, is proved by actual tests made at six large plants in various parts of the country. The lowest showed 13.4 per cent., and the highest 50.1 per cent. fuel saved, the average being 27.8 per cent.

If in connection with the mechanical stokers, we build overhead bunkers with chutes leading to the stoker hoppers, and install coal-conveying machinery, the labor of feeding would be reduced to a minimum, and one fireman could take care of a number of boilers, as his only duties would be to see that the hoppers are filled with coal, and to remove clinkers from the deadplates once in several hours.

The saving in fuel and labor when mechanical stoking is used, is not all of the economies that result when this method is adopted; there is also more flexibility in operation, or rather, an ability to respond promptly to unusual demands for steam, caused by variable loads; there is also increased boiler capacity, and a substantial reduction in the hight of the stack is possible.

Some of the mechanical stokers now in use are so built and operated, that they utilize most all the gases, and consequently do away with the question of smoke. This results from the method of firing which is so arranged that the fuel bed may be said to consist of three strata in which the green coal just introduced to the furnace forms the lower layer; the coal in the second layer is in process of coking, and the coal in the first or top layer forms the zone of complete combustion, composed of the incandescent coke. Each fresh charge of fuel elevates the coked coal only to the fire line, green fuel being unable to reach the fires. The smoke is eliminated at the stage where the coal is being coked and the gases distilled.

Another point worthy of serious thought in considering mechanical stokers, is that an inferior quality of coal can be used, where it would be impossible to utilize this same coal in hand firing.

In this present era of mechanical progress, when each individual as well as every company, is striving for supremacy in their special line, all devices that will afford increased efficiency and economy should certainly be considered, and mechanical stokers are now of such proven service that they are most worthy of careful investigation.

The first discoverers of alluvial gold in Victoria did not seek very far below the grass for the precious metal. Hiscock, who first found gold at Buninyong, and Esmond, who found it at Clunes, 25 miles or so north from Hiscock's find, were both scanning the surface when they stumbled on gold. At both those famous spots the surface yielded enormously of gold before the great rush of miners swept over the quartz-strewn fields of the schistose ranges.

Mineral Production of New York in 1905.

The mineral production of New York in 1905, as reported by D. H. Newland, assistant State Geologist, was as follows:

Product.	Unit of Measurement.	Quantity.	Value.
Portland cement	Bbl.	2,117,822	$2,046,864
Natural rock cem't	Bbl.	2,257,698	1,590,689
Building brick	M.	1,512,157	10,054,597
Pottery	....	.....	1,621,558
Other clay products	....	.....	2,603,861
Crude clay	Sh. Tons.	6,766	16,616
Emery	Sh. Tons.	1,475	12,462
Feldspar and quartz	L. Tons.	17,000	48,500
Garnet	Sh. Tons.	2,700	94,500
Glass sand	Sh. Tons.	9,850	7,765
Graphite	Lb.	3,897,616	142,948
Gypsum	Sh. Tons.	191,860	551,193
Iron ore	L. Tons.	827,049	2,192,689
Millstones	....	.....	22,944
Metallic paint	Sh. Tons.	6,059	70,090
Slate pigment	Sh. Tons.	2,929	22,668
Mineral waters	Gal.	8,000,000	1,600,000
Natural gas	M. Cu.Ft.	2,639,130	607,000
Petroleum	Bbl.	949,511	1,566,931
Pyrite	L. Tons.	10,100	40,465
Salt	Bbl.	8,575,649	2,303,067
Roofing slate	Squares.	16,460	94,009
Slate manufactures.	....	.....	1,600
Granite	....	.....	253,955
Limestone	....	.....	2,411,456
Marble	....	.....	774,567
Sandstone	....	.....	2,043,960
Trap	....	.....	623,219
Talc	Sh. Tons.	67,000	469,000
Other materials (*a*).	....	.....	775,000
Total value			$34,663,553

(*a*). Includes apatite, carbon dioxide, diatomaceous earth, fullers earth, marl and sand. The value is partly estimated.

As compared with the total output of the same list of materials in 1904, this shows an increase in value of $6,896,648 for the past year. The largest increases occurred in the cement and in the clay industries; more graphite, gypsum, iron ore and pyrite was mined in 1905 than in the previous year, but the output of a few minor substances—emery, garnet, slate, etc.—was less in the later year. The most noteworthy decrease was in the output of petroleum, and amounted to 86,668 bbl. valued at $142,839. The production of building stones remained about stationary.

The World's Famous Diamonds.

The following list gives the weight of the world's most famous diamonds: Kohinoor, after second cutting, 106 carats; Loterie d'Angleterre, 49 carats; Nizam of Hyderabad, 279 carats; Orloff, 194 carats; Kohinoor, after first cutting, 279 carats; Regent of Pitt, 137 carats; Duke of Tuscany, 133 carats; Star of the South 124 carats; Pole Star, 40 carats; Tiffany, yellow, 125 carats; Hope, blue, 44 carats; Sancy, 53 carats; Empress Eugenie, 51 carats; Shah, 86 carats; Nassak, 79 carats; Pacha of Egypt, 40 carats; Cullinan, 3025 carats; Excelsior, Jagersfontein, 969 carats.

The Federal Smelting Works, near Alton, Ill.[1]

BY O. PUFAHL.

The works of the Federal Lead Company, at Federal, near Alton, Ill., were erected in 1902. They have a connection with the Chicago, Peoria & St. Louis Railway, by which they receive all their raw materials, and by which all the lead produced is shipped.

The ore smelted is galena, with dolomitic gangue, and a small quantity of pyrites (containing a little copper, nickel and cobalt) from southeastern Missouri, and consists chiefly of fine concentrates, containing 60-70 per cent. lead. In addition thereto a small proportion of lump ore is also smelted.

A striking feature at these works is the excellent facility for handling the materials. The bins for the ore, coke and coal are made of concrete and steel and are filled from cars running on tracks laid above them. For transporting the materials about the works a narrow-gage railway with electric locomotives is used.

The ores are smelted by the Scotch-hearth process. There are 20 hearths arranged in a row in a building constructed wholly of steel and stone. The sump (4x2x1 ft.) of each furnace contains about one ton of lead. The furnaces are operated with low-pressure blast from a main which passes along the whole row. The blast enters the furnace from a wind chest at the back through eight 1-in. iron pipes, 2 in. above the bath of lead. The two sides and the rear wall are cooled by a cast-iron water jacket of 1 in. internal width.

Two men work, in eight-hour shifts, at each of the furnaces, receiving 4.75 and 4.25c. respectively for every 100 lb. of lead produced. The ore is weighed out and heaped up in front of the furnaces; on the track nearby the coke is wheeled up in a flat iron car with two compartments. The furnacemen are chiefly negroes. At the side of each furnace is a small stock of coal, which is used chiefly for maintaining a small fire under the lead kettle. Only small quantities of coal are added from time to time during the smelting operation.

Over each furnace is placed an iron hood, through which the fumes and gases escape. They pass first through a collecting pipe, extending through the whole works, to a 1500-ft. dust flue, measuring 10x10 ft., in internal cross-section. Near the middle of this is placed a fan of 100,000 cu.ft. capacity per minute, which forces the fumes and gases into the bag-house, where they are filtered through 1500 sacks of loosely woven cotton cloth, each 25 ft. long and 18 in. in diameter, and thence pass up a 150-ft. stack.

The dust recovered in the collecting flue is burnt, together with the fume caught by the bags, the coal which it contains furnishing the combustible. It burns smolderingly and frits together somewhat. The product (chiefly lead sulphate) is then smelted in a shaft furnace, together with the gray slag from the hearth furnaces. The total extraction of lead is about 98 per cent.

The direct yield of lead from the Scotch hearths is about 70 per cent. They also produce gray slag, containing much lead, which amounts to about 25 per cent. of the weight of the ore. About equal proportions of lead pass into the slag and into the flue dust. When working to the full capacity, with rich ore (80 per cent. lead and more) the 20 furnaces can produce about 200 tons of lead in 24 hours. The coke consumption in the hearth furnaces amounts to only 8 per cent. of the ore. The lead from these furnaces is refined for 30 minutes to one hour by steam in a cast-iron kettle of 35 tons capacity, and is cast into bars either alone or mixed with lead from the shaft furnace. The "Federal Brand" carries nearly 99.9 per cent. lead, 0.05 to 0.1 per cent. copper, and traces of nickel and cobalt.

The working up of the between-products from the hearth-furnaces is carried out as follows: Slag, burnt flue dust and roasted matte from a previous run, together with a liberal proportion of iron slag (from the iron works at Alton), are smelted in a 12-tuyere blast furnace for work-lead and matte. The furnace is provided with a lead well at the back. The matte and slag are tapped off together at the front and flow through a number of slag pots for separation. The shells which remain adhering to the walls of the pots on pouring out the slag are returned to the furnace. All the waste slag (containing about 0.5 per cent. lead) is dumped down a ravine belonging to the territory of the smeltery.

The lead from the shaft furnace is liquated in a small reverberatory furnace, of which the hearth consists of two inclined perforated iron plates. The residue is returned to the shaft furnace, while the liquated lead flows directly to the refining kettle, which is filled in the course of four hours. Here it is steamed for about one hour and is then cast into bars through a Steitz siphon, after skimming off the oxide. The matte is crushed and roasted in a reverberatory furnace (60 ft. long).

The power plant comprises three Stirling boilers and two 250-h.p. compound engines, of which one is for reserve; also one steam-driven dynamo, coupled direct to the engine, furnishing the current for the entire plant, for the electric locomotives, etc.

The coke is obtained from Pennsylvania and costs about $4 a ton, while the coal comes from nearby collieries and costs $1 per ton.

In the well equipped laboratory the lead in the ores and slags is determined daily by Alexander's (molybdate) method, while the silver content of the lead (a little over 1 oz. per ton) is estimated only once a month in an average sample. When the plant is in full operation it gives employment to 150 men. Cases of lead poisoning are said to occur but rarely, and then only in a mild form.

[1]Translated from *Zeit. f. Berg-Hütten- und Salinenwesen*, LIII (1905, p. 450).

Copper Mining at Rio Tinto.

The opencast mining operations have been steadily pushed on with, and the removal of overburden from one of the lodes has for some time past been carried out largely by the use of steam shovels, which not only cheapens the cost, but expedites removal. The copper output in 1905 was seriously interfered with by the drought which prevailed in the province of Andalusia; the scarcity of water making it impossible to wash the mineral heaps with sufficient frequency. The lack of rain does not reduce the quantity of copper being prepared for washing, but the output of copper suffers in a dry season. This shortage is made up again when water is sufficient, so that over a period there is no reduction in the quantity of the copper marketed.

The quantity of copper from the old furnace bottoms at Cwmavon, Wales, recovered during 1905 was 912 tons, against 3011 tons in the previous year. Before the end of 1906 it is expected to finish this operation and to abandon the old works and surrender their lease. The company has commenced to refine copper in a small way at the new refining plant erected on the dock side of Port Talbot, into which its own vessel directly delivers materials from Spain, and it is hoped soon to transfer the whole of the refining operations to these new works.

Too many testimonials are often ruinous to the man who is seeking a position. H. J. Hapgood tells of a man who was being favorably considered for a position as chief engineer and was on the point of being engaged. The negotiations were promptly called off when he produced 23 letters, of which 15 were from men for whom he had worked in the past three years. It is often better only to mention the names of firms from which you have letters, and other responsible persons to whom you can refer if desired.

Holborn and Austin (Preuss. Akad. Wiss. Berlin, Sitz. Ber., 1905, V. 175) have shown that the specific heat of carbon dioxide increases with the rise of temperature, the increments gradually becoming smaller. It is assumed from exterpolation that the specific heat at constant volume becomes constant in 1300 deg. C., viz., 0.2111.

Magnetite Deposits and Mining at Mineville, N. Y.—III.

BY J. H. GRANBERY.

The workings operated by Witherbee, Sherman & Co. comprise the Smith mine, Cook and O'Neill shafts; the Harmony mine, A and B shafts; and the Old Bed mine, Joker and Bonanza shafts. The last workings are contiguous to the "21" mine. They are shown in the illustration, Fig. 12. The shafts are respectively 650 ft. and 760 ft. in vertical depth. They are both 3-compartment shafts, with two skipways, and a ladder-way.

The two skips in the Bonanza both follow the same course, a vertical descent for 396 ft., then around a vertical turn and down a 16-deg. incline for 325 ft. and around another curve and down vertically for 255 ft. There is a landing-stage giving access to the upper portion of these workings, 110 ft. above the 400-ft. level.

The Joker shaft, tapping the same workings, is 650 ft. in vertical depth, but the two skipways do not both reach the bottom. One of them (that on the left, facing the shaft) runs continuously, at an angle of 72 deg. to the horizontal, to the top of the horse of rock previously mentioned, and then into the rock of the horse, ending 72 ft. above the bottom level, giving access to the upper portion of the workings. The other runs down at the same angle, turns a vertical curve and then runs, on a 26-deg. grade along the top of the horse, 300 ft. to another curve, whence it descends vertically to the level below. The location of this shaft may be seen from the general view of the works, Fig. 13, where the shaft house appears to the right, just beyond the tailings stacker.

Ventilation through all the mines is natural, the draft in these particular workings being down the Bonanza shaft and up the Joker. The shafts are timbered with 12 x 12-in. and 14 x 14 in. stuff down to the bench, running from there down between the rock walls. Very little water enters either of these two shafts. All workings are illuminated by electric light, both arc and incandescent, and in these workings especially, where the draft is strong and the fumes of blasting quickly removed, the effect is marked. The many gleaming faces of the crystalline formation reflect the rays of light and present the brilliance of a myriad of stars. The effect is hightened by the great distance between the floor and the roof. It is usually impossible, even with the light afforded by arc lamps, to see any indication of the roof other than the sparkle of these bright faces when the angular direction is such as to reflect the light from them.

The Harmony mine lies south of the Old Bed mine, and about half a mile away. The shafts tapping it are known as "A" and "B," and are shown in the illustration, Fig. 14, and in the map, Fig. 15. Both of these are 3-compartment shafts with two skipways and a ladder way. "A" shaft is vertical for 287 ft. and then turns through a vertical curve into an incline on a 16-deg. slope, descends around an arc of 80-ft. radius, until it strikes a vertical curve and descends a 45-deg. slope 148-ft. (vertical) to the bottom.

"B" shaft is vertical for 376 ft., it then swings through a vertical curve; and then, on an incline of 30 deg., descends 148 ft. (vertical) to the bottom. These two shafts, as are all the others except the Cook shaft at the Smith mine, are 17x8 feet.

At the foot of "B" shaft is installed a Knowles 6½ x 8-in. horizontal single-action triplex pump with pot valves and outside packed plungers. This is geared to a G. E. induction motor, form K, class 6-30-500, and has a capacity of 200 gal. per min., pumping against a head of 400 ft., and delivering through a 6-in. pipe. This has a relief, consisting of a ⅛-in.

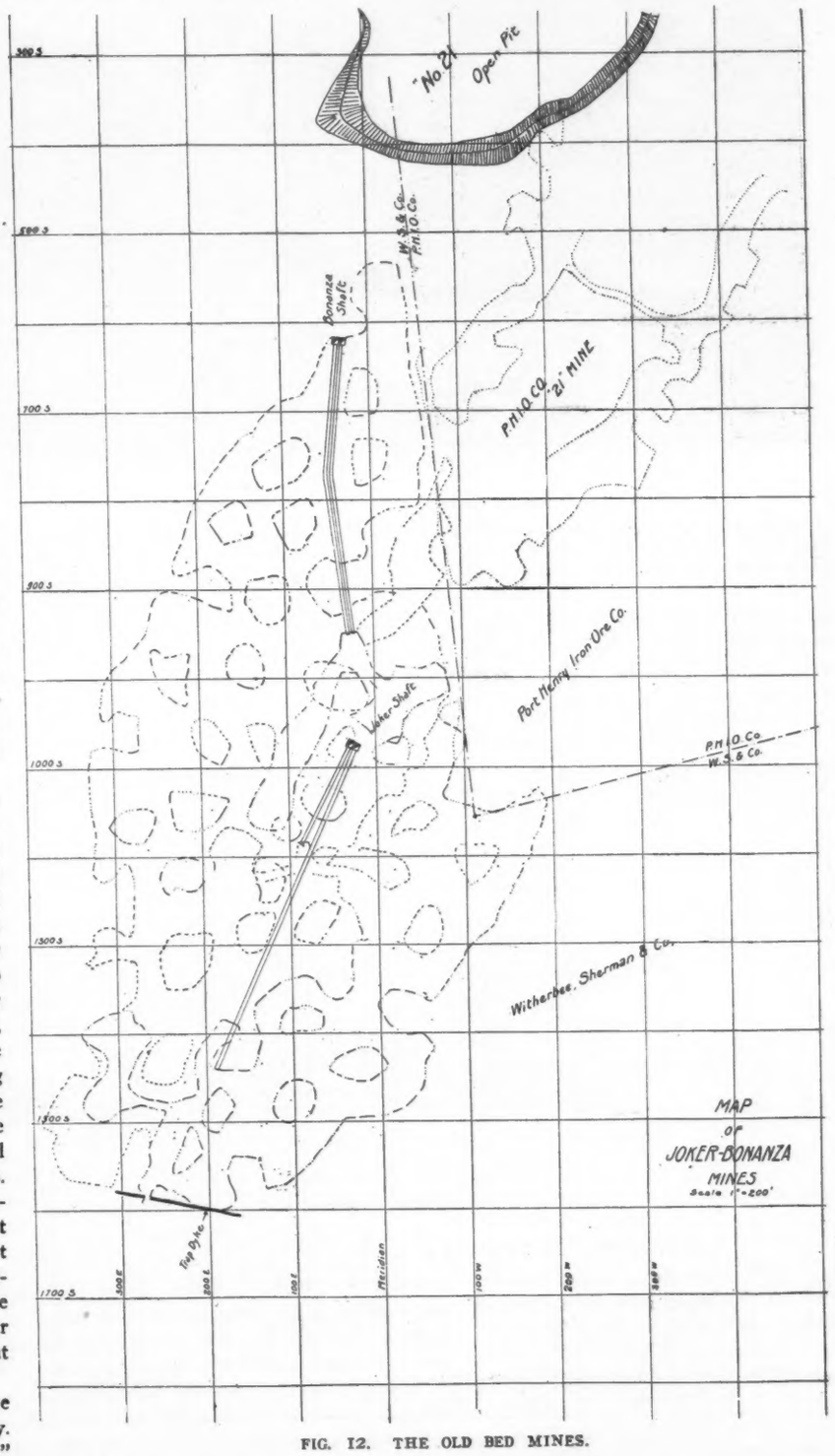


FIG. 12. THE OLD BED MINES.

bored hole in the pipe, which allows enough water to escape to drain the delivery pipe and thus cut down the starting torque required. The pump is operated through a barrel float in the sump. An emergency steam pump is also provided. This is a 9 & 18½ x 6 & 18-in. horizontal compound duplex, outside packed plunger pump, with pot valves, and a Knowles independent 6 x 10 x 12-in. horizontal air pump and jet condenser. This is placed directly over a sump in the mine at the foot of the vertical portion of the shaft. The sinking pumps deliver water to these sumps. The pumps used for sinking are of the Knowles pattern, No. 4, 6 and 8, operated on compressed air. The emergency steam supply is from

FIG. 13.

NO. 1. MILL. NO. 2 MILL. JOKER SHAFT.

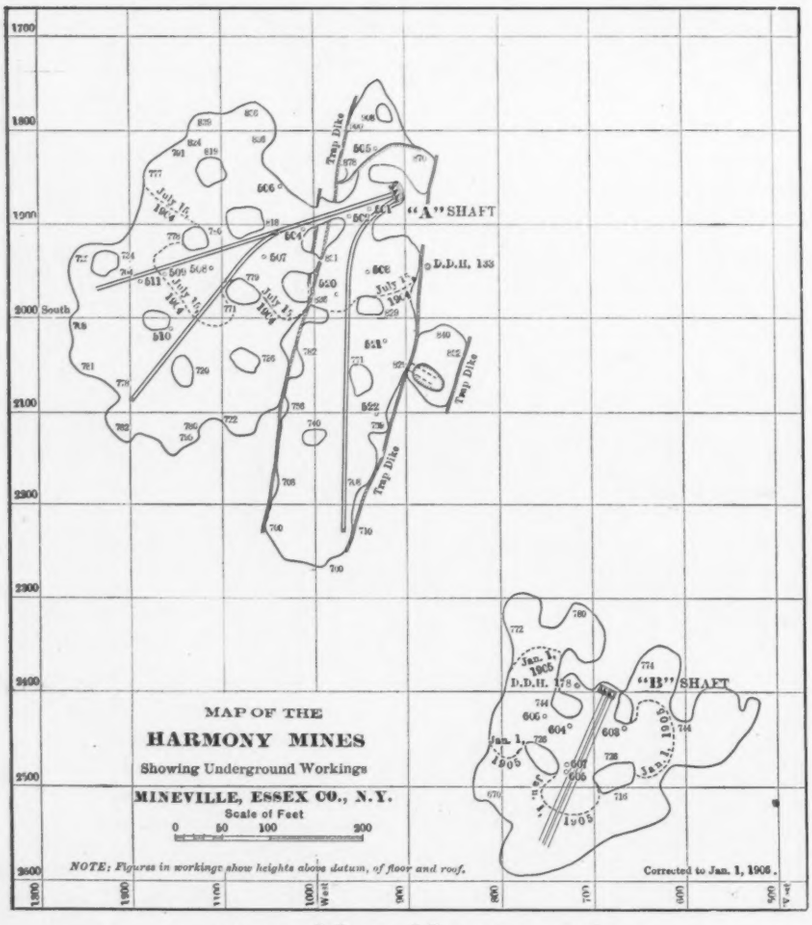


FIG. 15. "A" AND "B" SHAFT WORKINGS.

a battery of two Franklin horizontal return tubular boilers, 72 in. x 16 ft. These are installed in the boiler house shown in the general plan; together with their feed-pumps, a Knowles single action 6 x 8 x 10-in. and a No. 6 Warren pump. An extension of this building contains the machinery for working concrete blocks that is referred to elsewhere, and is also used as a curing room.

The Smith mine is about two miles northwest of the Old Bed mines, but of the same general character, though the pod-like nature of the deposit is more marked here than at the other workings. It was under water for 36 years, and was reopened and unwatered only two years ago. It is operated from the Cook shaft, a 4-compartment one, fitted at present with two skipways and a ladderway. It is 18 ft. square and drops vertically 150 ft. The two skipways are each curved in the horizontal plane, and run, on either side of a ridge in the bottom, at an incline of 30 deg. each, for 500 ft. (vertical) further. The O'Neill shaft, which is now being opened in the course of development work, is near this to the south of it. The two shafts are shown in Figs. 16 and 17, respectively, and their location with reference to the workings is seen in Fig. 18. The latter of these two shafts is operated by a steam hoisting engine during the progress of sinking. This will be superseded when the shaft has attained its working depth, by electric hoisting from the Smith mine substation, which can be

seen to the extreme right of Fig. 16, partly hidden by the trees. The Cook shaft house is at the extreme left of this figure, and a blacksmith shop (of which only the roof is visible) may be seen in the center of the immediate foreground.

two car-tracks which run under bins into which the skips dump are occupied by a locomotive and by a train of ore cars respectively. These bins are arranged in such fashion that the finer portions of the ore, which do not require crushing, drop

done, as is much of the other standardization of parts seen, with the idea of requiring as small a number of different types of repair parts to be kept on hand as may be. The shaft head frames, as well as the houses, are all of the same

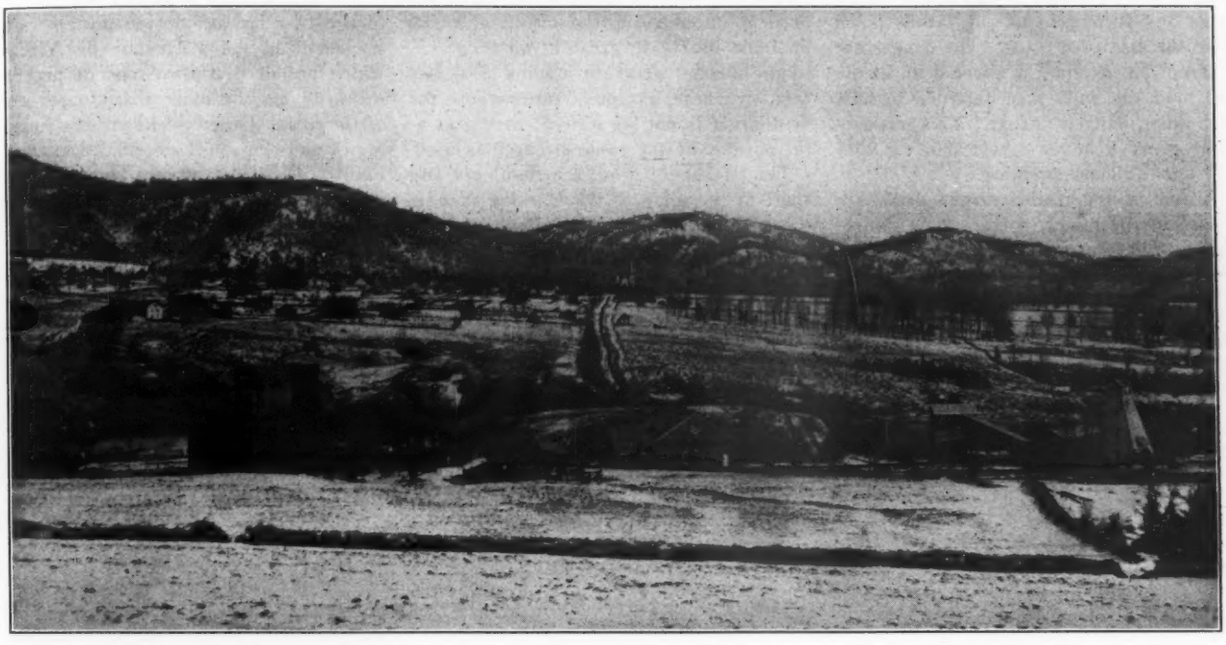


FIG. 14.

"A" SHAFT. HOIST HOUSE AND SUB-STATION. "B" SHAFT.

Speaking generally, the practice at all of these mines is the same; the shaft houses are all of the same general pattern, built of heavy timber with corrugated galvanized steel covering for sides and roof. The skips are of uniform size, 1½ tons capacity, and the hoisting speed, 600 ft. per min., is common to all of the instal-

through a grizzly directly into cars; or into a storage hopper, whence they are delivered into cars. The larger pieces which are carried on, fall, either directly into cars, or into storage bins over the outer track. The inner track is, in all cases, that used for the finer material.

The skip dumping arrangement, shown

type; with head-sheaves 8 ft. diam. and using 1⅛-in., 19-strand plow-steel hoisting rope.

The idler sheaves over which the hoisting rope runs from the foot sheaves to the hoisting drums, are 16 in. diam. and run on long pieces of 1½ pipe. This gives sufficient lateral movement to keep

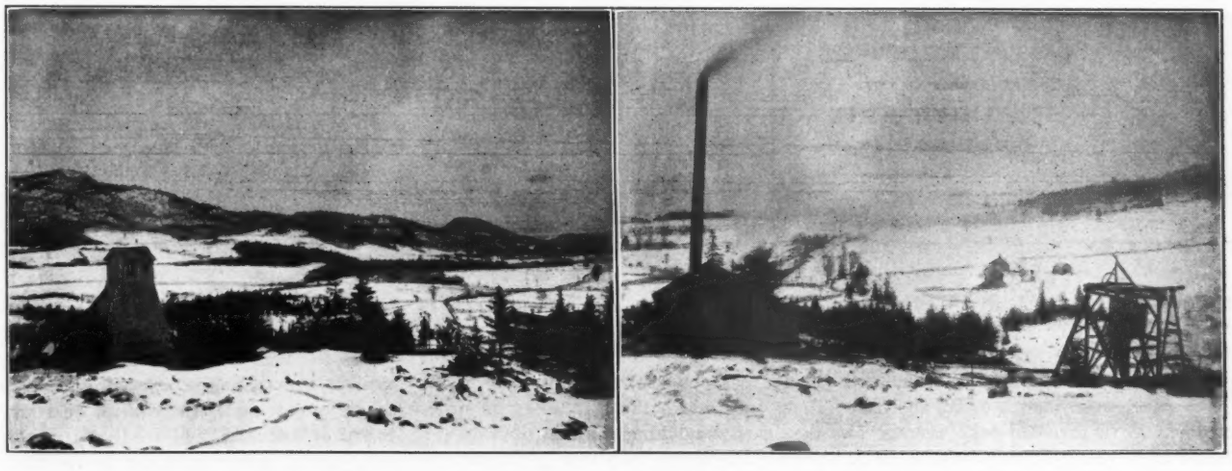


FIG. 16. THE COOK SHAFT. FIG. 17. THE O'NEILL SHAFT.

lations. The type of shaft house used is shown in Fig. 19 and the skip-dumping arrangement in Fig. 20. The first gives the best illustration of the construction of a typical shaft-house.

In the case illustrated the skip-ways are seen in the interior of the house through the opening in the side, and the

in Fig. 20, differs from the usual types and is well designed. It is almost out of the question for it to fail in its positive action, and over winding does not draw it back far enough to prevent the skip from righting itself in lowering. It will be seen that the wheels used are all alike; no extended treads are used. This is

the side strain in winding from pulling the main sheaves out of line. A pair of these idlers are seen in the illustration showing the Old Bed power station; they appear, with their vertical supports, in the lower left hand corner.

Fig. 21 shows a detail of the inclined foot sheaves at "B" shaft; these are

shown as presenting the most interesting detail (they operate, as will be seen, on different angles), though even here the standard type of wheel is used. The grizzly used for screening the crude ore as it is dumped from the skip at the shaft house is of peculiar construction; it is made of 6-ft. lengths of old T-rails taken from the discarded track. The flanges are sheared out, except for about 6 in. at the end, and the rails then fastened against each other, flange to flange. This arrangement gives a heavy serviceable rig that will stand almost anything.

About 35 Ingersoll-Sergeant drills are in use in the mines, operating on double shifts. These are of the 2¾-in. size and put down from 43 to 45 ft. of holes per man-day (ten hours). They are arranged, on account of the character of the ore drilled, to operate at a higher speed and on a shorter stroke than is usual, and have put down 48 ft. per man-day (average of one month's run). Hand-hammer drills of the "Little Jap" pattern are used to some extent and are giving satisfactory results. They are operated on roof work and block-holing.

The holes average about 8 ft. in depth; they are not drilled in any regular order and each hole is, to all intents and purposes, blown out by itself. They are all fired from fuses, for the reason that a series of holes fired by electricity is found to give pieces too large for convenience in handling; the large pieces have to be broken up and it is found more economical and less arduous to fire individual holes. Of course the firing is not so apt to produce falls of roof when done singly as when a number of holes are fired at once, nor is the resulting smoke or fume nearly so great in quantity.

The powder generally used is a 45 per cent. dynamite, except in cases where the ventilation is not so perfect; here a gelatin powder of the same strength is used.

The trackage from the foot of any shaft in the mine to the working face is short, and 1½-ton cars pushed by four men, are used. The tracks are laid to give ¾ of one per cent. grade down to the shaft bottom, thus relieving to some extent the exertion required to push the loaded car. A depression is made in the floor, into which the skip sinks, in order that cars may dump directly into it.

The maximum recorded production of the three mines of Witherbee, Sherman & Co. in one day of 20 hours is 1993 tons; this is crude ore, that has not been treated other than by hoisting to the surface and dumping into cars. The increase of production in 1905 over 1904 was 125,000 tons.

Never leave dynamite exposed to the direct rays of the sun.

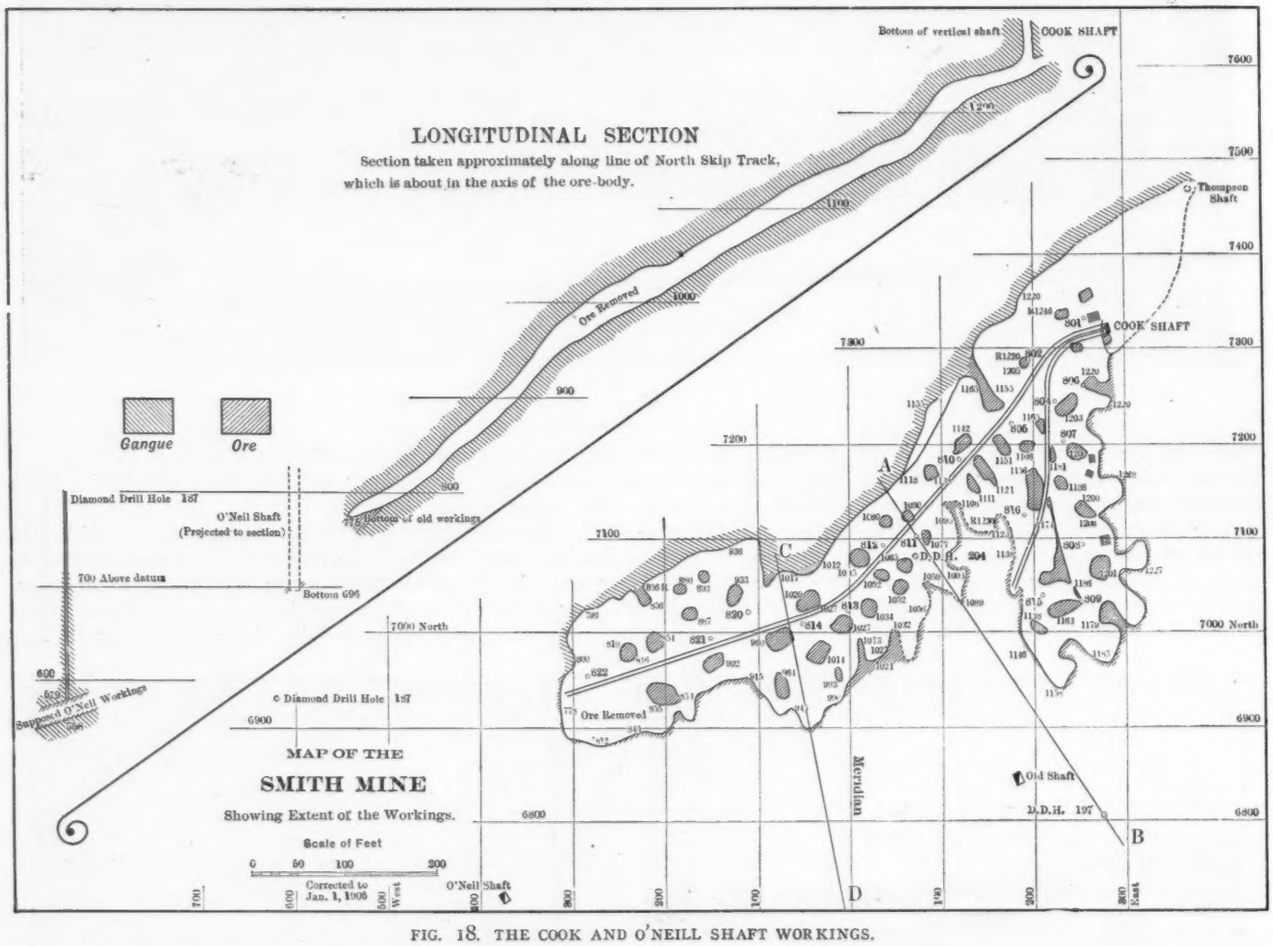


FIG. 18. THE COOK AND O'NEILL SHAFT WORKINGS.

Pig Iron in Spain.

Consul-General Ridgely, of Barcelona, reports that the output of pig iron in Spain during 1905 amounted to 383,100 tons as compared with 386,000 in 1904. There are 18 iron works in the country; of these by far the most important is the Sociedad de Altos Hornos de Vizcaya, which produced 209,000 tons of pig during last year, or more than 50 per cent of the total. Other works are the Fabrica San Francisco del Desierto, 28,000 tons; Fabrica de Mieres, 17,400; Duro-Falguera, 36,000; Moreda y Gijon, 11,600, and the Sociedad de Altos Hornos de Malaga, 24,000.

At White Cliffs, New South Wales, the Miners' Protective Association is endeavoring to regulate the opal-mining industry, by creating a monopoly of the whole output under the control of a local board of directors, and sending a responsible agent, with specimens, to Germany, for the purpose of ascertaining European values compared with local prices. He is afterward to visit America, and establish a depot in Chicago; subsequently proceeding to Paris and other Continental cities.

The United States in 1904 produced 99 per cent. of the entire world's known production of natural gas.

New Safety Catch for a Mine Cage.

Burton E. Kingsley, a well-known breaker builder of Scranton, has patented his new saftey catch for a mine cage, which some consider to be the most practical of the many efforts made to render the mine cage absolutely safe. Mr. Kingsley discards the old style "dogs" and has devised a scheme whereby the uprights of the cage are free and held in position so long as the rope or cable is taut. When there is a slackness in the rope, a powerful spring is released which forces the uprights against the guides in the shaft. In order to secure the necessary amount of friction,

FIG. 19. BONANZA (TYPICAL) SHAFT HOUSE.

the spring operates toothed wheels upon both sides of the cage, so that in case the hoisting cable breaks, the wheels are released and strike the guides, winding up a chain which forces the uprights against the guides with still greater force. The further the cage travels after the rope breaks, the greater the force with which the movable uprights are pushed against the guides.

As long as there is a pressure upon the rope the uprights will be in position, but the moment that the pressure is relieved, the uprights are thrown out against the guides and the cage is gradually stopped. The invention has the advantage that it does not catch the cage with a sudden jolt as is the case with dogs which clutch the guides. There is also no danger that in case the guides are covered with grease, the cage will slip down the shaft. The farther it travels, the greater the pressure caused by the toothed wheels rolling against the guides; in case the cage is thus held in the shaft, it can easily be released when the rope is repaired and the pressure withdrawn. Practical men who have examined the model are confident that it will be a success. Mr. Kingsley is arranging for a test in one of the local shafts.

Steam Blowers vs. Forced Draft.

There will shortly be placed in service at the Olyphant Colliery of the Delaware & Hudson Company what is reputed to be the largest fan and engine ever used for forced draft purposes. At collieries, the power for pumps, hoists, etc., is supplied by boilers of various types, but the horizontal return tubular are more commonly used, since there are few sudden demands for steam, and the water is not always of the best. These boilers usually have a large grate surface, and the fuel burned is of the lowest grades, often being coal which is not readily marketable. To permit burning this cheap coal, forced draft has for a number of years been favored by some, rather than high stacks, and the general method has been to use either comparatively small high-speed fans, or steam blowers. The latter method is said to be inefficient, since at full boiler

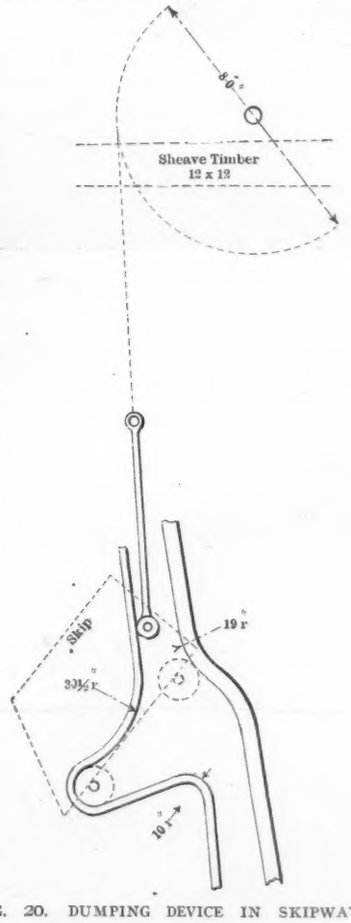


FIG. 20. DUMPING DEVICE IN SKIPWAYS.

rating, when depending on steam blowers alone for draft, approximately 10 per cent of the total steam is used, and except when required for softening the clinker, there is no advantage in the use of the system.

For a number of years it was held that high pressures at the ash-pit were necessary to burn this coal under forced draft, but the excellent results obtained by working on an entirely different principle has seemingly placed the forced draft system distinctly in advance. This in brief, is the use of large slow-speed fans handling ample quantities of air at low pressures. When the coal has a tendency to clinker, steam blowers may be used intermittently, but are not otherwise necessary and are not required for the draft.

The installation just referred to will supply 11 horizontal return-tubular boilers, and consists of a Buffalo Forge Company's 250-in. fan, with three-quarter housing, driven by a 15x20-in. heavy-duty engine. The maximum speed will not exceed about 80 r.p.m., and the engine will have a throttling governor with adjustment for changing the speed according to the number of boilers in operation, or other local conditions requiring more or less air supply. Each air-duct will be connected with the main duct by two separate pipes, each having a sliding gate. The ducts and connections are of heavy steel plates, painted inside and out.

At the Delaware & Hudson Company's Plymouth No. 2 colliery there is a similar installation consisting of a 210-in. fan with direct-connected engine, which has given exceptionally good results. This apparatus has never been required to operate at more than 90 to 95 r.p.m., and the air pressure at the fan discharge is approximately 0.5 oz. per square inch.

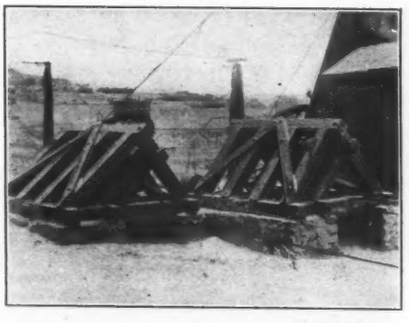


FIG. 21. INCLINED FOOT SHEAVES AT "B" SHAFT.

Utilizing Old Mill Cinder.

An instance of the modern utilization of old waste is shown in a recent sale of mill cinder in Maine. For nearly 50 years the Pembroke Iron Works were operated at Pembroke, Maine, finally closing down in 1886. During this time a large quantity of mill cinder, roughly estimated at 100,000 tons, had accumulated, covering an area of several acres along the river, adjoining the abandoned mill. Recently the cinder heap was sold by Sprague & Son, of Pembroke, to Boutwell & Co., of Boston. The material is now being shipped by sailing vessels to Hoboken and Elizabethport, N. J., whence it is set by rail to points in Pennsylvania, where it is used.

The white brasses, of which zinc is the principal ingredient, are noted for their drossy characteristics.

SMELTING WORKS OF THE ASHIO COPPER MINE.

GENERAL VIEW OF TSUDO, ASHIO COPPER MINE.

The Copper Mines of Japan.

Copper mining in Japan is an ancient industry. Its origin is almost beyond the time of authentic history, and the larger mines, whose record is well known and preserved, have been steadily operated for three or four hundred years. There are a number of smaller mines, some of which date back for more than double that time. The total output of the Empire in 1904 was 34,850 long tons of copper. Full figures for 1905 are not yet available, but there was probably a small increase in output. In this list of the world's copper producers Japan stands fourth, its total being exceeded only by the United States, Spain and Mexico. The output supplies all home needs, having been sufficient even to meet the great demand for the metal for use in cartridges and other war material during the recent conflict with Russia. Usually there are considerable exports, chiefly to China and other eastern countries.

The earlier operations, of course, followed rather primitive lines, but the Japanese metallurgists succeeded in turning out copper of fine quality. The years following 1870 were a period of transition, during which the old methods of mining, smelting and refining were replaced by more modern systems, and by improved machinery. The work was at first under the superintendence of American, German and English engineers; but at the present time the mines and smelting works are entirely under the direction of Japanese mining engineers and metallurgists. This period also saw an important change in the economical portion of the industry. The larger mines passed from the old individual or government ownership into the hands of large companies; and these corporations also absorbed a number of the smaller mines. The industry is now in strong hands. The mines of importance are well supplied with the best modern machinery—hoists, pumps, crushing mills, concentrators, etc. Electric transmission of power is largely used, including electric locomotives for haulage in the mines. The smelting furnaces are of approved types, and there are several large electrolytic refineries. Japanese practice is now entirely up-to-date. In some respects, hand labor is used more than in American mines; but this is to be expected in a country where the supply of labor is large, and wages are low.

The two best known and largest copper mines in Japan are the Ashio and the Besshi; the former producing about 7000 tons of refined copper, and the latter about 6000 tons yearly. There are nearly 300 places where copper ore is or has been obtained, but only about 50 mines are actually producing commercial quantities at the present time.

The Ashio mine, in the province of Shimotsuke, was first opened about 1610 and one hundred years later was a large producer. For many years it was operated by the Government, either directly, or under lease. In 1875 it passed into the possession of Ichibei Furukawa, who established the Furukawa mining firm, which existed until 1905, when it was reorganized as the Furukawa Mining Company, under the Japanese commercial code. In addition to the Ashio, this company now owns five other copper mines—the Ani, the Kusakura, the Nagamatsu, the Mizusawa and the Furokura, and the Innai silver mines. It operates four collieries, at Katsurio, Shiogasura, Shakanoo and Shimoyamada, which furnish all the coal and coke used by the company, with a large surplus for sale.

The ore of the Ashio is almost entirely sulphide. The deepest workings are about 1250 ft. The average smelter return of the ore mined is about 4 per cent. copper. A small quantity of high-grade ore, hand-picked, is sent directly to the smelter. Most of it is concentrated, however, to a product averaging about 15 per cent. copper. There are at the mine a stamp mill and three concentrating mills. The smelting works have a capacity of 700 tons of ore daily. The crude copper is treated in the bessemer converters and finally refined in the electrolytic plant.

The Furukawa Company markets its copper in several different forms. Bessemer bars, direct from the Ashio converters; ingot copper, made at the Honjyo works from crude copper obtained from some of its mines, which has a high ductility; "tiles," made at the Shinonome works, from Ani and Shinonome copper; and electrolytic copper, in ingots, wirebars and cathodes, from the Honjyo works. The company also turns out wire, sheets and other finished products. The Ashio copper carries a small proportion of silver.

The Besshi mine, which is second in importance only to the Ashio, was opened in 1690, and has always been a large producer. It has always been in the possession of the Sumitomo family; in recent years it has been organized under the modern law as the Sumitomo Copper Company. It is situated in the Ehime district of Iyo province in the island of Shikoku. Like the Ashio, it has been provided with modern machinery, and work is conducted on approved lines. Electric transmission is largely used in operating the mines and smelter. The ore is chalcopyrite, with a large quantity of pyrite, and the mine also yields small proportions of lead, manganese and arsenic. The average return is about 6 per cent. copper. The smelting and refining works are on a large scale, and provided with the best machinery and appliances.

Many of the smaller mines are controlled by these large companies, or are tributary to them, sending their ores to the smelters or conde copper to refineries.

The accompanying illustrations are from photographs, for which we are indebted to the courtesy of Matsumoto Otagawa, assistant manager of the Furukawa Copper Company. Kotaki, shown in one of the illustrations, is at the southwest extremity of the Ashio mine. The mill shown has a yearly output of 11,000 tons of concentrates, averaging 15 per cent. copper. Tsudo, shown in another view, is at the southern end of the Ashio, the mill turning out 24,000 tons of concentrates and dressed ore yearly, averaging 12.4 per cent. copper. Another illustration is a general view of the Ashio smelting works which have, as stated above, a capacity of 700 tons of ore daily, and turn out about 7000 tons of copper yearly.

The remaining illustration is a general view of the Ani copper mine in Ugo, which is owned and operated by the Furukawa company. The yearly output of this mine is about 1600 tons copper and 20,000 oz. silver.

Transvaal Mining Notes.

SPECIAL CORRESPONDENCE.

March results encouraged everyone on the Rand. The output of 443,723 oz. for the Transvaal establishes a record. The Wolhuter mine again enters the producing list, with an output for March of 5015 oz. A new producer in the outside districts, the Louis Moore mine, contributed 592 oz. to the output.

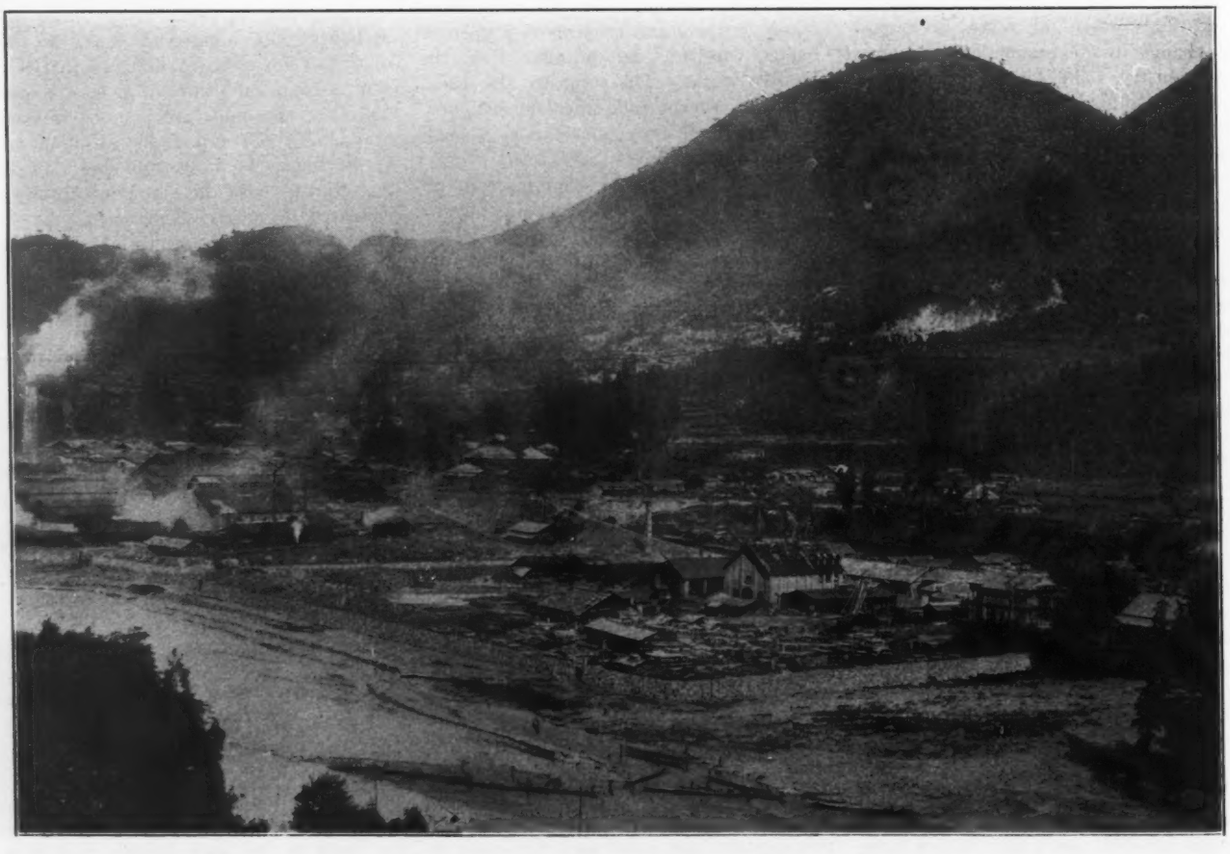
Probably the feature of the month is the high stamping duty attained on some of the mines, due to the use of tube-mills. The Knights Deep leads the list with a stamping duty of 7.98 tons per stamp per 24 hours. One mine crushed at the rate of 9 tons for a little while, so that it is safe to count on a duty of at least 8 tons, when the tube-mills are in good working order. Without tube-mills a stamp can get through about 5.5 tons per day, so that by their use the stamping capacity is increased by nearly 46 per cent. As the extraction is better, one is safe in saying that tube-mills on the Rand are proving a success.

As regards yield per ton, there were fourteen companies recovering over 40s. per ton; six of these show a value of over 50s. per ton crushed. The Robinson mine leads the list with a recovery value of 55.27s. per ton. Of the gold recovered for March, 64.3 per cent. was obtained from the mill, and 35.7 per cent. in the cyanide works, from concentrates, sand and slime.

Several of the struggling mines came out below the pay line in March, the most unfortunate being the Lancaster, which shows a loss of £1022.

The Cinderella Deep in the far eastern Rand has made another strike in the vertical shaft. At a depth of 4021 ft., a reef 36 in. wide was found, assaying 18.3 dwt. This is the second reef found in this shaft. People are watching developments at this mine with keen interest, for it is most encouraging for deep mining on the Rand to find such payable reef at a depth of 4000 ft., and over.

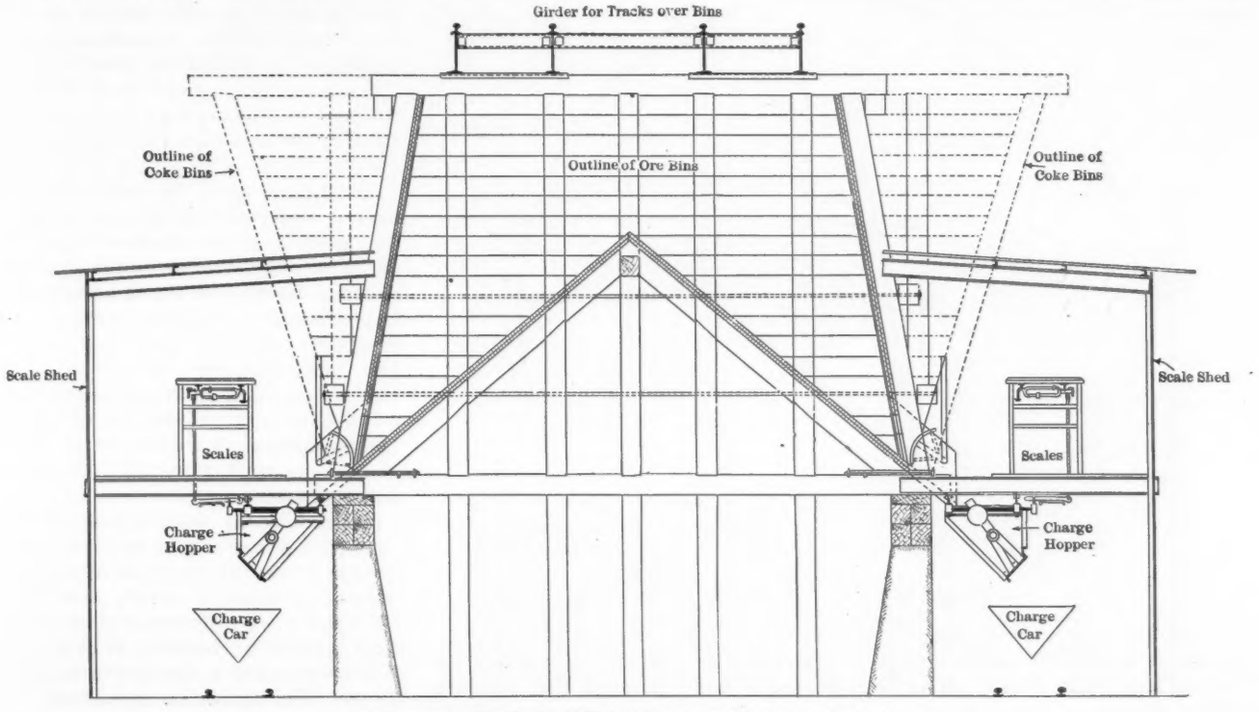
GENERAL VIEW OF KOTAKI, ASHIO COPPER MINE.



ANI COPPER MINE, UGO, JAPAN.

Ore Bins of the Old Dominion Smelter.

At the smelting works of the Old Dominion Mining and Smelting Company, at Globe, Arizona, timber bins with a capacity for 2500 tons of ore and 750 tons of coke are in use. These are shown in cross section in the accompanying illustration. The structure is 225 ft. over all, and 20 ft. high above the top of its foundation walls, a total of 29 ft. The bins have 30-ft. bottoms, and the coke bins are extended at the top to 44 ft. in width, and are 18 ft. on centers, with the exception of one 10 ft. 8 in. bin. The ore bins are 26 ft. wide on the top and are also placed on 18 ft. centers. The dotted lines in illustration show coke bins; the full lines ore bins. Each of the latter has four discharging gates, two on each side. The coke bins



BINS AND WEIGHING HOPPERS—OLD DOMINION SMELTER.

are provided with five gates on each side.

Each individual gate has its own weighing scale. This is supported, on the flooring shown, on a level with the bin bottom, and is housed in a steel-frame shed. Weighing hoppers with a capacity of 25 cu.ft. are suspended below the scale beam. The cars used are tip cars, electrically operated, and hold (each) 37½ cu.ft. They operate on a 36-in. gage track, which is on a level with the furnace-charging floor. In loading the cars one man operates the bin gate and weighs the desired amount of ore or coke into the weighing hopper set below the gate. The charges are dropped into the charge car from these, and the material is delivered from them directly to the furnaces.

In operating three furnaces nine men are required on each shift. These attend to the drawing of the ore and coke from the bins, the weighing of the charges, tramming the charge to the furnace floor, and giving the furnaces the required attention. The labor is distributed as follows: Two men for drawing off and weighing the ore and coke for charges; three men operating the charge train; three men attending to the furnaces, and one general foreman. It is possible with this force to handle 1700 tons of ore per day, and it is stated that with one additional man at the furnaces on each shift, four furnaces instead of three could be kept in operation. Before the material is delivered to the bins it is weighed in the cars on a 150-ton railroad scale, and it is thus possible to keep a close check of the amount of fuel and ore used. The large number of scales are used for facilitating the weighing out of self-fluxing charges as expeditiously as possible.

The Nitrate of Soda Combination.

At the meeting of the producers and promoters at Iquique, Chile, on March 31 some concessions were made on both sides. It was then agreed that should 96 per cent. of the producers concur by April 3, in forming a new combination on an estimated producing capacity of 3,800,000 tons per year for all of the 147 manufacturing plants a new agreement would be entered into. At the meeting of April 3 it was found that 99½ per cent. were ready to concur.

The prospect of having 3,800,000 tons of nitrate thrown on the market during the next twelve months, while there is no prospect that more than 2,000,000 tons will be consumed during the same period, together with the fear that the Chilean Government would legislate against those not entering the combination, was more than the manufacturers were willing to risk.

The term of the new combination is for three years, dating from April 1, 1906, on a basis of a possible producing capacity of all of the "oficinas" of 3,800,000 tons yearly, each "oficina" to submit to a pro rata reduction in its producing capacity to conform to the consumption of the previous year. The production for the next twelve months will probably be cut down to 2,000,000 tons.

New railroad projects are being considered by the Chilean Government, and also by individuals, including another road across the Andes farther to the south. The present trans-Andean line has been opened to Juncal, leaving only a 30-mile gap over the Uspallata Pass, which is traversed by coaches in summer to the Argentine side, where trains can again be boarded.

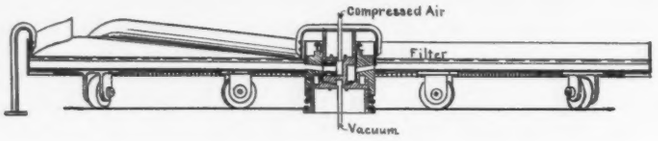
Diamond deposits were recently discovered at Douradinho, district of Coromandel, Estrella do Sul, Brazil, in the bed of the river. The diamonds are of very fine quality and perfectly limpid. Good prices have been realized. The famous Estrella do Sul was found in this locality two centuries ago, which gave its name to the place.

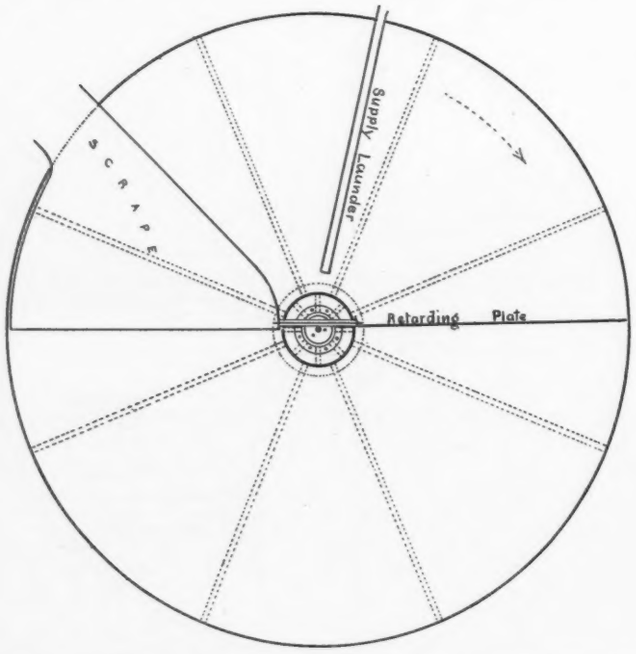
The German Emperor has conferred decorations upon the German miners who took part in the rescue work at Courrières. The leader of the party, Mr. Engel, of Essen, receives the order of the Crown of the third class. Mr. Engel is editor of *Glückauf*.

The Parrish Continuous Filter.

BY EDWARD PARRISH.*

The continuous filter herein described was designed in the summer of 1904 for a milling plant in Nevada, but the mill was closed down early in the fall of that year and pending the re-organization of the company the work of 1905 was small in amount and largely experimental on other lines, so that the filter has not had the advantage of a practical test, but is here described as a contribution to the problem of slime filtering.





The design is based on the employment of a fixed launder delivering the slimes upon a horizontally revolving filter so arranged that a large proportion of the filter surface is covered with a shallow layer of the solution to be filtered, and is subjected to a partial vacuum, while at the same time the remaining small portion of the filter is cut off from the vacuum and subjected to compressed air, or simply atmospheric pressure, and the dried cake is being removed from it without interfering with the continuous movement of the apparatus.

The filter consists of a shallow tank revolving around a central spindle, with the periphery supported on small wheels running on a circular track. The usual filtering medium of canvas and matting is supported slightly above the bottom of the tank, and the space below it is divided into as many compartments as may be desired (in the design referred to eight) by means of air-tight radial partitions. The central spindle contains a vacuum chamber and a valve chamber, the former connected with a pump for the maintenance of the vacuum and delivery of the filtered solution where desired; the latter communicates with a compressed air pipe or directly with the atmosphere. The compartments below the filter connect by short conduits with these chambers. At any one time all of the compartments, excepting one, are in communication with the vacuum chamber, and the filtered solution from them is passing through it to the pump. The excepted compartment at the same time, having had all practicable solution extracted from it, is in communication through the valve chamber with the compressed air, which assists in loosening the cake preparatory to its removal by a slightly inclined scraper. In order that the surface of the filter cloth may not be injured by the scraper it is covered with coarsely perforated steel or thin strips of steel upon which the edge of the scraper rests. After the compartment has been cleaned it immediately passes under the supply launder and receives a fresh charge.

In order that the liquid slimes may not flow back upon the compartment being cleaned, a canvas screen weighted on the bottom is suspended just forward of the scraper and rests upon the filter surface, while to prevent the too rapid flow forward, retarding plates are introduced which are adjustable as to their hight above the filter and control the depth of the slime upon it.

The successful operation of any continuous filtering system depends largely upon the ability to remove the cake without interfering with the operation of other parts of the apparatus and experience seems to indicate that this must be accomplished by mechanical means other than the simple use of compressed air, or by hand. From published accounts of the Moore process, in which the filters are placed in the most advantageous possible position for detachment by compressed air, some scraping is necessary.

The capacity of this filter, 15 ft. in diameter, with the sides of the tank 6 in. above the top of the filter surface making one revolution in eight minutes is estimated to be sufficient to provide for the filtration of 50 tons of dry slimes with solution in the ratio of one ton of slime to five tons of solution in 24 hours, leaving about 25 per cent. of moisture in the residue.

At all times ⅞ of the filter surface is filtering under the influence of vacuum. This gives a surface of 152 sq.ft., which at the rate of revolution above stated is presented 180 times in the 24 hours to the supply launder; through this surface must pass 75 per cent. of 250 tons of solution or 6000 cu.ft., equivalent to 33⅓ cu.ft. at each revolution, or an average depth over the effective surface of the filter of 0.22 ft. The accumulation of residue on the filter would be somewhat less than ½ in. at each revolution.

By attacking the problem in detail and making the operation continuous the troublesome matter of the recovery of the valuable solutions is greatly simplified. The capacity is greatly increased by a very slight increase of diameter, as each foot of diameter adds vastly to the filtering surface. The application is not only intended for the final filtering in the process of agitation, but is equally desirable in the intermediate steps as diminishing the number of dilutions by reason of the greater extraction of solutions at each step. It is not a new process requiring an extensive installation, but an inexpensive adjunct to the most common form of slime treatment.

In a patent granted to M. Schwartz, and reported in *The Engineer* (London, Mar. 9, 1906), the inventor proposes to relieve the pressure on the foot step-bearing of a vertical shaft continuous-current generator by winding the armature coils obliquely to its surface, at an angle of about 45 deg., the pole pieces of the machine being similarly skewed. It is claimed that vertical upward pull is thereby obtained, which neutralizes the weight of the armature.

*Newport, R. I.

Control of Hydraulic Mining.*

BY WILLIAM W. HARTS.

To save their farms from inundation caused by raising the floodplane ot the rivers, and to prevent the bottom lands of the Sacramento and San Joaquin valleys of California from being ruined by the accretion of debris from the mines in the mountains and foothills, legal remedies were resorted to by the valley people; and by about 1880, the once enormous industry of hydraulic mining had been successfully throttled by the injunctions of the Local and Federal Courts. The feeling between the miners and the valley people became acute, and much bitterness resulted. The State of California made extensive investigations, but found it could not cope with the difficulty. The Federal Government was then appealed to; examinations were ordered by Congress in 1880, and again in 1888. The former was made and a report submitted to Col. G. H. Mendell (Corps of Engineers, U. S. Army); the latter was made by a board of three officers, all of the corps of engineers. On the report of this board, Congress passed (March, 1893) a mining law which has since been known as the Caminetti Act, from the name of its proposer in Congress. This act was ostensibly for the protection of the navigability of the Sacramento and San Joaquin rivers, by preventing them from being filled with mining debris and their depth thus reduced to a point where free navigation would be impossible. It was hoped by those interested in mining in California that the application of the law would be far wider in its benefits, and would give the long sought privilege of operating the mine without hindrance. This law created a Federal Commission to regulate hydraulic mining in such a way as to prevent any injury to navigable waters, with ample power to stop all such mining until satisfactory impounding facilities for detritus were provided by each mine.

BRUSH RESTRAINING DAM
SHOWING METHOD OF CONSTRUCTION

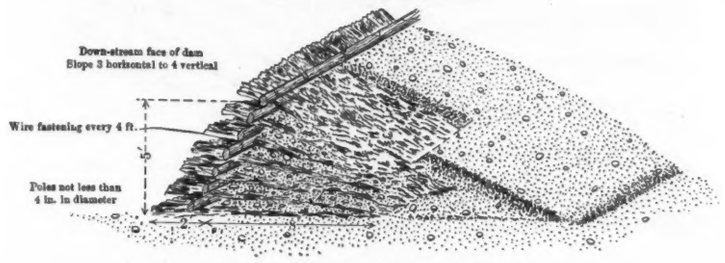


FIG. 1. BRUSH DAM, STRUCTURE.

The constitutionality of such an enormous interference with the interior affairs of one of the States of the Union as was embraced in this law, was based on the provision of the Constitution of the United States, assigning to the Federal Government the duty of regulating the commerce between States; and, incidentally, of protecting the navigable highways. It was presumably understood in Congress that the steps necessary to protect the interests of navigation from the mining-debris evil would necessarily protect all the agricultural interests, as the greater includes the less; so that if the engineers in charge could devise a method which would protect satisfactorily the navigability of the rivers affected, the other questions involving private rights would solve themselves; the depths of the rivers being affected so quickly, would thus afford a delicate test of injury. Any mining that would cause no appreciable shoaling in the navigable rivers could scarcely be of injury to any other interests. If the navigability of the rivers was protected, therefore, the problem that had been of such long standing could be soon settled. This law it was thought, would thus permit the resumption of hydraulic mining under such restrictions as might be necessary to protect the rivers. The act provides for a Federal board of three engineer officers of the army (appointed by the President and confirmed by the Senate) to be called the California Debris Commission. It became their duty under the law to devise plans that would permit hydraulic mining to be resumed, under sufficient restrictions to prevent injury to the lower rivers and the land lying adjacent thereto. The Commission's jurisdiction was limited to the water-shed of the Sacramento and San Joaquin rivers; but, within these limits, all hydraulic mining was prohibited except with a license or permit of this Commission. A maximum penalty of $5000 fine and one-year's imprisonment was imposed for violation of the act.

The Commission was directed also to devise projects that would improve the navigability of the rivers above named and their tributaries; protect their banks against encroachment and damage from mining debris; and restore, as far as required by the needs of navigation, the navigability of the rivers as it existed in 1860. What has been accomplished by this Commission since its organization is the subject of this paper.

Duties of the Commission—To check the injury to navigability by restraining works, and to rehabilitate hydraulic mining as far as practicable, were the duties imposed upon this Commission by the act. The supply of new detritus from the hydraulic mines had, by that time, been mainly, if not entirely, stopped by injunctions of the Federal and State courts, prohibiting all such mining: but the flow of debris was still continuing, due to the washing down at every flood, of a part of the enormous quantities already stored in the upper reaches and the tributary cañons. The damage once started could not be wholly overcome by injunctions.

FIG. 2. BRUSH DAM FINISHED.

In designing restraining works, there was no precedent nor previous experience from which valuable lessons might be learned by the new Commission; everything had to be originated as no such condition probably exists elsewhere in the world. In addition to all this, the miners were clamoring for permission to resume mining under the new law, insisting that they be told of the restrictions so that

*Abstracted from a paper ("The control of hydraulic mining in California by the Federal Government"), presented May 2, 1906, by Capt. William W. Harts, U. S. A.; *Proceedings Am. Soc. C. E.*, Vol. XXXII, No. 2, Feb., 1906; pp. 95-124.

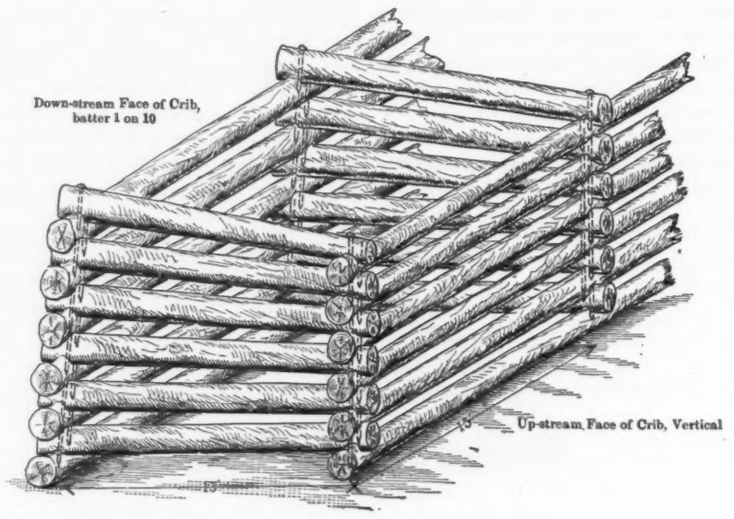
they might comply with the law, it found practicable, and be permitted to resume their business legally. It was found in many instances that the construction of dams in the cañons below the mines would store all the material that would be moved; in some cases there were old hydraulic mine pits that could be filled with detritus without damaging the lower rivers.

Impounding Dams—Various kinds of dams were tried: stone, earth, brush and rock, log-crib filled with rock, and many others. After 12 years of experience it has been found that the usual small mines (where impounding dams can be used) will need one of the two general types: either log-crib dams, or brush dams. There are special cases, of course, when other kinds of dams are needed; but these two types are most common for the smaller mines; and printed specifications for these dams with a cut explaining their construction have been prepared by the Commission.

The log-crib is the usual type. It consists of a "cob-house" crib, made of large logs which are notched and drift-bolted together. It is filled with quarried rock, and chinked against leakage. This type of dam is seldom built more than 40 ft. high, this being the limit of safety placed by the Commission for the usual case. These dams are very satisfactory for their purpose when well made. As long as they are kept wet they are practically permanent; and even in those locations where the hight. Figs. 1 and 2 and the illustrations given herewith show their construction in both places.

Requirements for a License—Before being permitted to mine, under the United States laws, the hydraulic miner must have a license or permit from the California Debris Commission. In order to obtain this license he must submit an application, or petition (on a form supplied by the Commission) in which he states under oath, the location and description of his mine; its extent; the source and quantity of his water supply; the dimensions and grade of his sluice boxes; what restraining work he proposes; the precipitation of rain and snow; the drainage area above his mine; and several other items of information which affect the flow of detritus. This application is advertised in newspapers for three weeks, to permit any protests to be filed with the Commission. If no protests are received, an inspection of the mine and its impounding facilities is made, and the location and kind of restraining dam is decided upon in consultation with the owners of the mine. An order is sent by the Commission to construct the restraining works decided upon; and later another inspection is made when the works are completed. If these works are found satisfactory on this second inspection, a revocable license to mine is issued. Monthly reports are then required from the mines thus licensed, showing the quantity of material mined and condition of the dam.

ONE POCKET OF LOG CRIB DAM
BEFORE CHINKING OR FILLING



SKETCHES SHOWING METHODS OF CHINKING DOWN-STREAM FACE

FIG. 3. LOG-CRIB DAM.

FIG. 4. LOG-CRIB DAM.

logs rot, due to their being dry part of the time, the rock being angular and well bedded in gravel, will resist erosion long after the logs have failed to bind the dam together.

The brush dam is less used, as it is permitted usually only when the water-flow over the dam is small, or when the river is diverted through a spillway at one end, and only when the slope of the cañon above is slight. These brush dams are not permitted more than 20 ft. in total

Inspections—Frequent inspections are made to prevent illegal operation and to maintain control of the licensed mines. Mining without licenses (or even dams), and the use of various tricks to avoid building and maintaining dams, are practiced to a limited degree; but it is seldom that legal steps are necessary to stop this sort of illegal operation. In this way the debris from hydraulic mining has been so regulated that very little is now added to the old supply. These restrictive measures, unfortunately, have been too great to permit the resumption of hydraulic mining on the large scale formerly followed; but, on the other hand, they have permitted many mines to operate that otherwise would have had to remain idle.

Protection of the Navigable Rivers—The other side of the Commission's duty is the study of the rivers of the Sacramento and San Joaquin systems, with a view to the preparation of plans for the treatment of these streams and their tributaries so that the injurious mining detritus may be kept out of the navigable rivers, and the streams restored to their former condition of navigability as far as may be needed. The first step, after preventing the operation of mines where debris was not properly impounded, was the treatment of the larger tributaries to prevent the enormous quantities now in their beds from reaching the navigable streams.

General Principles of Improvement—In undertaking the formulation of a plan for these rivers, the engineer officers adopted a general line of work that was believed to be applicable. It consists of three divisions:

(1). The construction of moderately high dams in the foothills where the rivers emerge into the valleys, and where the value of the land is not great. These dams, being located where the slopes in the river-bed are comparatively high, were placed there with a view to sorting the heavy material (that will stand on high slopes) from the fine material that will not; thus storing this heavy material where it will be impounded cheapest.

(2) Embankments and basins lower down the river forming settling pools, where the slopes are flatter and where practically all the finer material can be deposited, at all except high stages of the river, by bringing the flowing water almost, if not entirely, to rest.

(3) Training walls in the remainder of

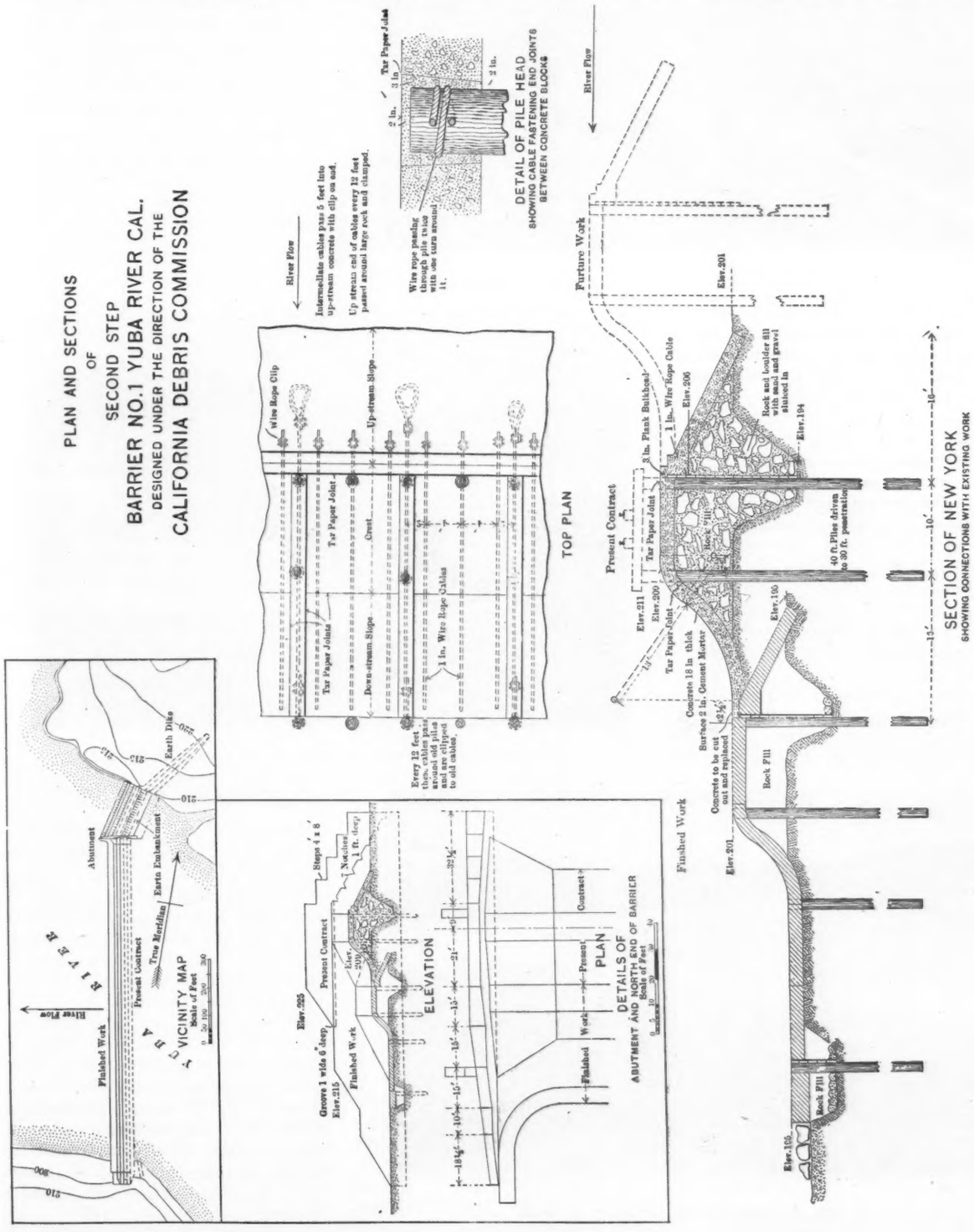


FIG. 5. PLANS OF DAM SERIES, NEW WORK, ETC.

the lower river, to confine the flow in selected channels so that the large quantities of debris now in the river-beds, outside these walls, should not be overflowed, and thus could lie undisturbed indefinitely.

Yuba River—It was decided to commence the work of restraining the debris on the Yuba river, as this stream has suffered more from mining debris than any other in California, and is causing the most trouble in the navigable rivers. After a study of several years, and after extended surveys in which numerous borings were made, a plan was adopted by the Commission and submitted to Congress in 1900. The plan has since been modified from time to time as the progress of the work rendered necessary. The estimated cost was $800,000; of which the State of California, under the provisions of the Caminetti act, pays one-half. This project was adopted by Congress, and funds appropriated therefor. The project provided for:

(1) Barriers across the river just below Smartsville, to hold back the coarse detritus from the upper reaches.

(2) A cut at Daguerre Point which is to divert the river at high stages; with embankments forming a settling basin for impounding fine material during the remainder of the year.

(3) Training walls, about 2000 ft. apart, extending from Daguerre Point to the Feather river, to confine the flow to a selected channel.

(To be continued.)

FIG. 6. DISHONEST SECRET GATE IN SLUICE.

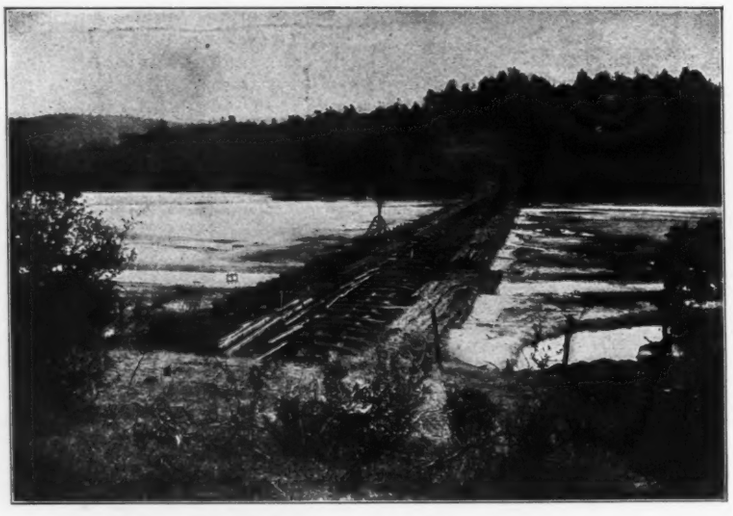


FIG. 7. TAILING DAM WHICH FAILED IN FRESHET.

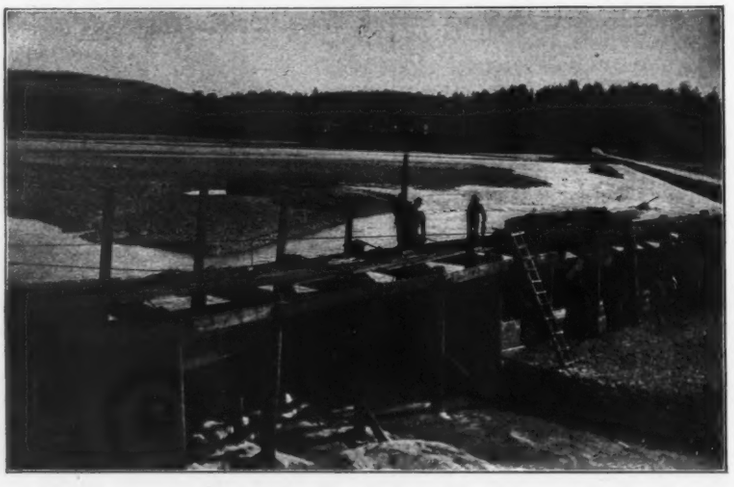


FIG. 8. UNSUCCESSFUL CLOSING OF DAM.

The Vortex Disintegrator.

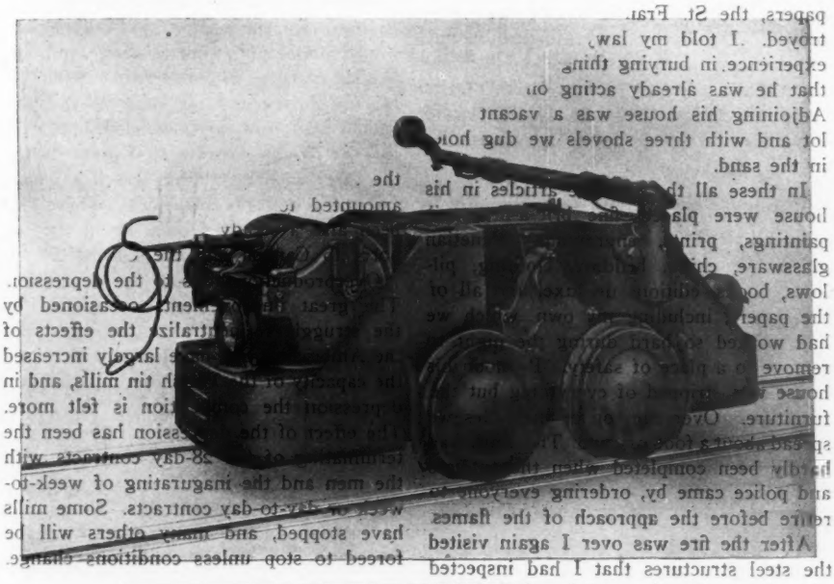
The Vortex disintegrator used in Australia consists of a steel cylinder 6 ft. diameter and 5 ft. deep, with an inverted conical bottom, and fitted with an inverted conical diaphragm, with a hole in the center to admit a vertical shaft to which a propeller is attached, and with holes round the periphery to allow circulation of the mixture. A constant supply of KCy solution is here introduced, and the pulp is drawn down the inside cone, thoroughly mixed and disintegrated, and then circulated up through the holes at the periphery, to overflow through a 0.25-in. screen to a storage sump, from which it is periodically pumped to the agitators, one of which its contents just fill. The agitators are steel cylinders 5 ft. diameter, 12 ft. high, tapered at the bottom.

Repairing Water Jackets.

In repairing a frost-cracked water-jacket, W. D. Graves states that a patch was made of stiff band iron, long enough to cover the crack, and 2½ in. wide; then there were cut out of heavy asbestos mill-board two thicknesses of the same size, the whole center of which was removed, leaving only a rim about ½ in. wide. This rim of packing was then laid over the crack and packed full of a mixture of equal parts of fine cast-iron borings and finely powdered quicklime; then the iron patch was clamped tightly over it and the jacket filled with water. The expansion of the lime, when wet, forced the mixture into the crack, which soon rusted tight enough so that the patch was removed, the surplus lime scraped off and the jot finished.

A Gathering Locomotive.

The common tendency heretofore in the development of electric mining locomotives for use in gathering service has been to adapt standard designs principally by addition of a cable reel. Efforts in this direction have involved the use of the standard two-motor type of locomotive, having side frames and fitted with two independent motors carried on the axles. This type of locomotive has not, as yet, been built sufficiently compact to fulfil properly the usual requirements of gathering work. For narrow gages, the frame is often outside the wheels. In this type the over-all length is sometimes excessive, because of the construction required for accommodating two motors. Other matters, including length of wheel base, general over-all dimensions, flexibility for operation over poor tracks, etc., combine to render difficult, if not thoroughly impracticable, the satisfactory adaptation of a standard type of locomotive to the conditions of gathering service.



GATHERING LOCOMOTIVE.

In taking up this problem, the Goodman Manufacturing Company has treated it as a subject of special design, recognizing the peculiar character of the work as distinctly different from regular haulage service. The illustration shows the new Goodman "M. S. 2" gathering locomotive, its design dictated by careful analysis of the conditions to be met. As a principal requirement there has been recognized the necessity that a really efficient gathering locomotive must be of such size and weight as will enable it to go wherever a mine car can go, and with equal facility. This requirement has been kept in mind throughout the design of the locomotive itself. The cable reel, by means of which the locomotive is enabled to run into rooms and other parts of the mine where the trolley wires are not extended, is a separate piece of mechanism, operating independently of the locomotive gearing. This feature of separate operation for locomotive reels is of great importance and worthy of careful consideration.

As regards the locomotive, it should be noted that the wheel base is very short and that the wheels themselves are very small. Only one motor is used and this is built in as a unit with the locomotive frame. The axles are fitted with springs so as to afford a flexible wheel base which will enable the locomotive to follow a rough track even more easily than will the mine car itself. By gearing of special design and arrangement the armature of this single motor, built into the frame, is in driving connection with both axles, yet without interfering with the flexibility of wheel base.

This design and arrangement of a single motor geared to both axles enables extreme compactness for the whole locomotive, as is especially desirable in the matter of over-all length or of distance from center of axle to center of drawbar at either end. The value of this characteristic will be appreciated in consideration of the necessity that such a gathering locomotive shall haul a mine car, with short hitch, around room-neck curves of small radius.

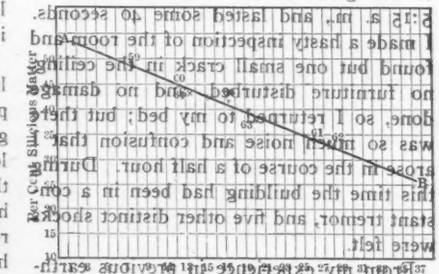
The might of the locomotive is made to count to the full extent of its weight, which is 7 tons. All operating devices are located conveniently within easy reach of the motorman. Fittings and electrical equipment are of high standard. The brake of this locomotive is worthy of note, being very powerful and providing accurate and close control, inasmuch as the brake band is applied to a high-speed surface and is operated by a lever handle with ratchet latch.

This new gathering locomotive is no larger than the average mine car, yet is extremely strong and of very simple design. It marks an essential departure in gathering locomotive construction, principally in that it recognizes the special character of gathering service.

Determination of Table Concentration.

BY JOHN W. SHAW.*

The method described herein has been used to determine the degree of concentrating done by Wilfley tables treating arsenopyrite in mill tailings, this arsenopyrite to be treated later on by the bromocyanide process for extracting gold and silver. These concentrates have, of course, a high reducing power and in assaying the stocks of the cyanide treatment plant must be added to the charge. To every charge assayed 5 grams of nitrate are added and the resulting lead button weighed in grams to the second place. A duplicate determination of each sample was then made and from this data the accompanying curve was plotted.



The line A B being once established it is only necessary to weigh the lead button resulting from an assay charge containing the same amounts of ore and nitrate as the charges by which the line A B was plotted. Then following the vertical line corresponding to this point to its left will show the amount of silicious matter in the concentrates.

The determinations of silicious matter in the concentrates can be made very quickly as follows: Weigh out 2 grams sample, add 20 cc. of aqua regia and evaporate to dryness. Take up the residue in 10 cc. of HCl, dilute and filter. Burn and weigh the residue.

The method described herein could be used for determining the amount of silica present in an ore, having an oxidizing power, by keeping the reducing agent added to the assay charge a constant.

As this chart is used only for determining the amount of silicious matter present in the concentrates for which it was plotted. A glance at the table of approximate reducing powers of the three minerals shown below will make this point clear. The lead button will of course vary with the variable reducing power of the several minerals. It is therefore necessary to plot a new curve when another kind of concentrates is to be treated.

* Boston-Nella Gold Mining Company, Goldboro, Nova Scotia.

May 5, 1906.

The San Francisco Earthquake.*

BY JOHN B. FARISH.

I have experienced all three of the great earthquake shocks that have visited San Francisco; the first in October, 1865; the second in October, 1868; and the last on April 18, 1906.

At the last date I was at the San Francis hotel (the new Crocker) on Union Square. My room was on the ninth floor. On Wednesday morning I was awakened by a loud rumbling noise which might be compared to the mixed sounds of a strong wind rushing through a forest and the breaking of waves against a cliff. A concussion, similar to that caused by a near-by explosion of a huge blast, shook the building to its foundations, and then began a series of the liveliest motions imaginable, accompanied by a creaking, grinding, rasping sound, followed by tremendous crashes, as the cornices of adjoining buildings and chimneys tottered to the ground. The shock occurred at 5:15 a. m., and lasted some 40 seconds. I made a hasty inspection of the room and found but one small crack in the ceiling, no furniture disturbed, and no damage done, so I returned to my bed; but there was so much noise and confusion that I arose in the course of a half hour. During this time the building had been in a constant tremor, and five other distinct shocks were felt.

From my experience in previous earthquakes, I knew that the principal damage would be on the filled in or made land, along the water front and in the Mission; so I went as rapidly as possible to the Oakland ferry and began a tour of inspection. From that point I could count seven separate fires, each blazing fiercely, and learned for the first time that the water mains in this section of the city had been disconnected. I visited a number of steel fire-proof structures that had been erected on solid land. These, like the St. Francis hotel, were not seriously damaged by the earthquake. The outer walls were slightly cracked, in most instances the cracks being hardly perceptible. Inside, nearly all the damage was between the third and sixth floors, and was confined principally to the plaster, especially the heavy ornamental plaster, which fell in considerable quantities.

As the fire advanced, the rapidity with which buildings were consumed beggars description. I watched the destruction of the large buildings facing New Montgomery street from Market to Howard, as well as those along Market street. Among these were the Crossley and Rialto. From the time the first flames showed in these buildings, only 30 to 45 minutes elapsed before the walls fell, a complete mass of ruins. The monumental Call building, a steel fire-proof structure, took fire and became a roaring furnace that in less than 30 minutes burned itself out, leaving the structure standing, a monument of desolation; but one that can be readily rebuilt and made as strong and beautiful as ever.

In the wooden districts, buildings of the ordinary San Francisco type of three stories would burn in from 20 to 30 minutes. The heat was intense; and this, together with the rapidity with which the buildings were destroyed, made it possible for such a vast section of the city to be entirely consumed within three days. Even the basalt and granite paving blocks in the streets were chipped in conchoidal fragments by the great heat of the burning buildings.

During these days of destruction I had made the acquaintance of a lawyer at whose home I had temporarily stored my papers, the St. Francis having been destroyed. I told my lawyer friend of my experience in burying things and I found that he was already acting on this idea. Adjoining his house was a vacant sand lot and with three shovels we dug holes in the sand.

In these all the movable articles in his house were placed—fine bric-a-brac, oil paintings, prints, engravings, Venetian glassware, china, bedding, clothing, pillows, books, editions de luxe, and all of the papers, including my own, which we had worked so hard during the night to remove to a place of safety. By noon his house was stripped of everything but the furniture. Over the top of the holes we spread about a foot of sand. The work had hardly been completed when the soldiers and police came by, ordering everyone to retire before the approach of the flames.

After the fire was over I again visited the steel structures that I had inspected after the earthquake, and found that they had withstood the additional calamity of fire in a remarkable way. I have little doubt that nearly all can be repaired and put in as good and as strong condition as they were originally, and this at a lower cost than architects and builders had any idea of before the calamity came upon the city. Judging from the rapid tour I made, before the fire, of that portion of the city principally affected by the earthquake, I should say that the total damage by earthquake would probably be covered by $6,000,000, certainly by $10,000,000, or 2 to 3 per cent. of the total loss.

Old San Francisco, the San Francisco of the pioneers and the bonanza days is gone. The old landmarks connected with the history and romance of the city are wiped out forever; but San Francisco will be rebuilt and rebuilt on the same site. The insurance money will doubtless be paid. An opportunity is offered to the citizens to beautify their city and make it the safest of any in the country to live in. If they will immediately condemn property along certain streets, dividing the city into sections separated by wide avenues; if they will erect additional reservoirs on the high hills; and finally, if they will put in a system of salt water for fire purposes, I can see no reason why San Francisco should not be one of the safest places in the world in which to live. It will certainly be rebuilt in modern fashion on the present site. This calamity has shown beyond doubt that the best form of construction yet devised is the steel building with modern fire-proofing. Such structures will undoubtedly be the office buildings of the San Francisco of the future.

*Abstracted from the *Denver Republican*, May 6, 1906.

The Tin-Plate Industry.

Consul D. W. Williams, of Cardiff, reports that there is a marked depression in the tin-plate trade of Wales, which began to be felt when the disturbances occurred last year in the Russian oil field. In 1904 Russia bought 30,530 tons of tinned plates and tinned sheets from the Welsh makers, but its demand fell off rapidly during the last months in 1905, and it has now practically disappeared, for the Welsh exports to Russia during the three months ending March 31, 1906, amounted to only 219 tons. There has been also a steady falling off in the exports to Canada and the United States.

Overproduction adds to the depression. The great improvements occasioned by the struggle to neutralize the effects of the American tariff have largely increased the capacity of the Welsh tin mills, and in depression the competition is felt more. The effect of the depression has been the terminating of the 28-day contracts with the men and the inagurating of week-to-week or day-to-day contracts. Some mills have stopped, and many others will be forced to stop unless conditions change.

Ferrocyanide Titration.

It is commonly recommended, in titrating ferrocyanide with zinc sulphate, to determine the end point by placing on a piece of iron free filter paper; first a drop of the liquid examined, and then a drop of (acidified) ferric chloride solution. The end point is reached when a blue streak ceases to form after a minute or two at the junction of the two drops. In the *Zeit f. Angew. Chemie*, 1906, p. 615. D. Stavorinus points out that the test may be simplified by using Schleicher & Schüll's filter No. 598, which contains a trace of iron. With this the use of ferric chloride becomes unnecessary, the blue coloration appearing after a minute or two owing to the iron in the paper.

The copper clamps used as a connection to the carbon elements of some types of electric batteries become coated, when in a damp place, with carbonate of copper; this is especially marked in the case of the sal-ammoniac cell, where the salts used tend to attract moisture.

THE ENGINEERING AND MINING JOURNAL

Contents.

	PAGE
Editorials:	
Notes	1051
Cost of Anthracite Coal	1051
The California Debris Records	1051
The Chinese Copper Mintage	1051
The Anthracité Railroads	1052
Mechanical Stoking.....*F. W. Parsons*	1033
Mineral Production of New York in 1905	1033
The World's Famous Diamonds	1033
The Federal Smelting Works near Alton, Ill.....*O. Pufahl*	1034
Copper Mining at Rio Tinto	1034
*Magnetite Deposits and Mining at Mineville, N. Y.—III....*J. H. Granbery*	1035
Pig Iron in Spain	1038
New Safety Catch for a Mine Cage	1039
Steam Blowers vs. Forced Draft	1039
Utilizing Old Mill Cinder	1039
*The Copper Mines of Japan	1041
Transvaal Mining Notes. *Special Correspondence*	1041
*Ore Bins of the Old Dominion Smelter	1043
The Nitrate of Soda Combination	1043
*The Parrish Continuous Filter. *Edw. Parrish*	1044
*Control of Hydraulic Mining. *Wm. W. Harts*	1045
The Vortex Disintegrator	1048
Repairing Water Jackets	1048
*A Gathering Locomotive	1049
*Determination of Table Concentration. *Jno. W. Shaw*	1049
The San Francisco Earthquake. *Jno. B. Farish*	1050
The Tin-Plate Industry	1050
Ferrocyanide Titration	1050
The Handling of Colored Labor. *C. S. Herzig*	1055
Mineral Production of Norway	1057
Coal in Indo-China	1057
Metallics	1053
Colliery Notes	1054
New Publications	1058
Professional Papers	1058
Abstracts of Official Reports:	
Anaconda Mining Company	1058
Wallaroo & Moonta	1059
Patents	1059
Personals	1060
Obituary	1060
Societies and Technical Schools	1061
Industrials	1061
Trade Catalogs	1061
Construction News	1062
Special Correspondence	1062
General Mining News	1068
Foreign Mining News	1071
Markets	1071

**Illustrated.*

OUR FRIENDS in San Francisco are not dismayed by their misfortunes. They are meeting them bravely, and are determined to hold the city's place as a great center for mining machinery and supplies. The many notices in our "industrial" column this week and in the previous issues, show their activity and resolution. We wish them all success in the work.

Cost of Anthracite Coal.

A contribution to the perennial discussion on the cost of anthracite coal is found in the report of the Delaware, Lackawanna & Western Railroad Company, for 1905, just issued. The report of the Coal Department gives more detailed figures than are furnished by any other anthracite company. Moreover, the statement includes the coal used by the company, which adds to its value.

The average total receipt per ton was $4.02, the coal being used by the company being credited at only $1.09 per ton; this credit is below the average cost, but it must be remembered that nearly all of it is small coal, and not of the prepared sizes sent to market.

The average receipt and cost per ton of coal are ascertained from the report as follows:

	Per Ton.	Per Cent. of Total.
Receipt	$4.02	....
Mining and preparing	$1.76	43.8
Transportation	1.66	41.3
Selling	0.15	3.7
General expenses	0.11	2.7
Total expenses	$3.68	91.5
Profit	$0.34	8.5

The profit of 34c. on a ton of coal appears small. To this, however, must be added the profit made by the railroad from the transportation. This can only be approximated from the figures given in the report; but it appears to have been about 72c., which would raise the company's total net earnings to $1.06 per ton of coal mined. This includes the coal used by the company, the omission of which would make some difference, but the averages cannot be completed without it. The average rate per ton-mile on coal charged on the railroad was 0.871 cent. and this is 0.183 cent. per ton-mile higher than the average rate on general freight.

The California Debris Records.

All the records in the office of the Corps of Engineers, U. S. A., in the Flood building, corner of Fourth and Market streets were totally destroyed during the great fire in San Francisco. This includes the records of the California Debris Commission, which is empowered by law to control and regulate hydraulic mining in California. Plans of all debris-impounding works built or designed, drawings of dams, and locations of mines, records of permits, withdrawals and applications and in fact everything connected with the business of the commission and the hydraulic mines of the State disappeared in the flames. This was a local commission appointed by the President of the United States to deal with hydraulic mining in California, and is composed of officers of the Engineer Corps of the army. Whether or not copies of all records, maps, drawings, etc., were required to be forwarded to the Secretary of War, is not known to the general public. If not, there will probably be more or less confusion and the mines may have to be examined again by engineers. In this connection it may be noted that the suggestion has been made that the hydraulic mines of the drainage basin of the Sacramento and San Joaquin rivers, be again allowed to run without restrictions or impounding works, in order that they may as formerly make an annual yield of $10,000,000, instead of the present $1,000,000, this added gold to be used in resuscitating the business interests of the State. While this would, of course, be most satisfactory to the hydraulic miners—for they could largely increase the gold output if permitted—the plan would be vigorously opposed by the Valley counties and especially the Anti-Debris Association. Even the suggestion alone has brought about a vigorous set of opinions by different persons, and seems to have again revived discussion of what was supposed to be a settled issue.

The Chinese Copper Mintage.

The large exports of copper from the United States to China, which began to attract attention during the early part of 1905, remained mysterious for several months. It was early reported that China was requiring copper for coinage purposes, but it was difficult to believe that this explanation, which later became generally accepted, could account for the very large amount of copper that was being taken by China; and even up to the

end of the year, especially when Chinese copper began to be resold to Europe and America, suspicion continued rife that a speculative movement was in some way involved in the transactions. We have previously printed several articles, from Chinese sources, outlining and explaining the situation.

Some recent consular reports, American and British, throw much light upon the matter. Mr. Cloud, the American vice-consul at Hankow, has just reported that the copper coinage industry in Chekiang, "which for many months has proved a veritable gold mine for the group of mandarins in charge of it," has recently all but collapsed and the local mints have shut down, at least for the present. The alleged reason for this suspension is that they are waiting for the new uniform stamp adopted by the Imperial Government for all the provinces, but investigation discloses that the merchants generally have instituted a boycott against the new coins, refusing to accept them in amounts exceeding 20 cents Mexican.

Mr. Frazer, the British Consul General at Hankow, in a report dated in March, states that the abnormal importation of copper for currency purposes, commented upon in his last previous annual report, was insignificant in comparison with the figures for 1905, in which year the copper imports represented one-third of the total foreign imports for the year. Ten-cash tokens poured from the mints in Wuchang, and the Hanyang arsenal set up nearly a score of presses for stamping the disks. The numbers struck at the three mints during the Chinese year are given as 1,864,000,000, 1,524,000,000, and 483,000,000, a total of 3,871,000,000. Late in the autumn, the Central Government, either alarmed by the rapid depreciation in the market value of these tokens, or jealous of the enormous profit netted by the Provincial Government, forbade the importation of ready-made disks. This check found Hupei with a stock of about 2000 tons of copper, which had cost on an average, at least £80, and was not salable at much over £79. About 800 tons of ingots were resold to Europe before the Chinese new year (Jan. 25).

The exportation of copper from the United States to China in 1905 was almost an even 40,000 tons. The new ten-cash piece contains from 206 to 222 grains of pure copper, or say 33 cash to the avoirdupois pound. On this basis, and the statistics of the mintage reported by Mr. Fraser, about 59,000 tons of copper was actually coined in 1905. China obtained some copper from the United States during 1904, in which year the American exports to China were not reported separately, and also obtained supplies from Australia and Japan. Complete statistics of the importation of copper into China in 1904 and 1905 are not yet available. It is, however, quite evident that the large purchases of copper by China during the last two years were really for coinage purposes, and for nothing else; and, moreover, that the resales of Chinese copper at the end of 1905 were comparatively small in amount and were due to the necessity for realizing upon some uncoined copper, compelled by the late action of the Chinese Government.

The Anthracite Railroads.

The railroad rate bill, as it has been formulated and passed by the United States Senate, contains a provision prohibiting railroad companies engaged in interstate commerce from owning or operating coal lands and dealing in coal. This is an amendment added to the bill in the Senate, and has still to pass the House of Representatives; though in view of present public opinion and the previous attitude of the lower House, there is little doubt that it will be accepted. While it is probable that two or three prominent soft-coal carriers were held in mind by the authors of this amendment, it is generally assumed—and probably with truth—that it is aimed at the group of railroad companies which now control the output of anthracite coal in Pennsylvania. Several years are to be allowed for the process of dissociating the functions of common carrier from those of miner of and dealer in coal.

It is assumed in some quarters, and proclaimed by some newspapers, that this law will result in a revolution in the anthracite trade, and in great changes in the position of the so-called anthracite roads. It seems to us, however, that such results are not to be expected, and that—as in the case of other "popular laws" which we have known—the effects of this provision of the railroad rate bill, if it becomes law, will be practically very small.

At the present time, these railroads, with the exceptions to be noted, do not nominally own the coal lands, nor do they operate them; though they do control the mining and selling companies through the ownership of stock. Thus the Lehigh Valley Coal Company and the Coxe Brothers Company own the collieries tributary to the Lehigh Valley Railroad. The New Jersey Central Railroad operates through the Lehigh & Wilkes-Barre Coal Company; the Erie through the Hillside Coal and Iron Company and the Pennsylvania Coal Company; the Pennsylvania Railroad through the Lykens Valley, the Susquehanna Coal Company and others.

The Philadelphia & Reading Railroad Company owns no coal stock, that of the Philadelphia & Reading Coal and Iron Company being the property of the Reading Company; a holding company, which also owns the stock of the railroad. We do not, of course, mean to say that the ownership is not practically in the railroads; but the law looks at legal technicalities, as well as at facts. A legal fiction is often quite effectual in practice. Moreover, there is nothing to prevent a transfer of the stocks of the various coal companies to other parties, which will really preserve and continue the alliance, while removing all legal appearance of running counter to the provisions of law. The recent sale of the Baltimore & Ohio Railroad stock in the Consolidation Coal Company to a syndicate, undoubtedly made in anticipation of this law, is an instance of how matters may be managed in a legal way.

Only two important anthracite railroads own and operate their coal lands directly, without the intervention of a coal company. These two are the Delaware, Lackawanna & Western and the Delaware & Hudson. Both of these companies work under charters granted many years ago; and in both the coal-mining feature was originally the more important, the transportation line being rather the subsidiary part. Without going into the law deeply, we are not at all sure whether under the Dartmouth College decision, which has governed the law of contract and charter for so many years, these two companies could not hold their present position against any provision in the rate bill. It will be a knotty question for the courts. And it is not likely that the present position of the anthracite trade will be materially changed by the new law.

Metallics.

An alloy which will withstand the action of water under pressure in a metal valve and which is used by one of the largest firms in the country, consists of the following ingredients: Copper, 10; tin, 1; zinc, 7/16; lead, ⅛.

Valves on iron pipes of hydraulic systems are often channeled out by iron scale carried along by the water. This scale is almost as bad and abrasive as sand. An increase of lead in the mixture will make a metal which will resist the wear better.

Detaching hooks used in connection with cages should be taken off, together with the bridle chains, and thoroughly cleaned, oiled, and overhauled at frequent intervals. Those that depend for their action upon the shearing of a copper rivet should have a fresh rivet put in when overhauling.

An exchange has just discovered that an alternating current of high intensity will cause an incandescent lamp held in the hand, or pointed at by a person connected with the source of current, to glow or emit a light somewhat similar to that given off by the Geissler tube in the well-known experiments of years ago.

A paint that adheres to plaster, and that has the merit of being waterproof, is made of powdered mica mixed with enough collodion to make it flow. The mica is first bleached by fire, then boiled in hydrochloric acid and finally washed, dried, and reduced to a powder. It is applied in the same manner as ordinary paint.

A solution of one part sulphuric acid and two parts water; applied to the scaled surface of cast iron with a cloth rolled in the form of a brush, using enough to wet the surface well; will completely remove the scale if allowed to stand for eight or ten hours. At the expiration of this period, a simple washing with water will leave the surface clean and clear.

The principle of the Montejus is the same as that of the ordinary wash bottle, high pressure air entering by a small pipe at the top, pressing on the surface of the pulp, and forcing it up a large outlet pipe, which reaches almost to the bottom. When full the valve from agitator to Montejus is closed, and that from the latter to the filter press opened, the air at 90 lb. to the square inch is turned on, and the slime is forced into the presses on the floor above.

In plate-girder design that section is most economical which has the area of the web plate equal to the area of the flanges; i. e., the weight of the two flanges, including cover plates, should equal the weight of the web plate, including stiffeners or reinforcing plates. Of course, in building work, restrictions of floor depth will largely govern the depth of the girders; but in open situations, such as bridges and trestles, this principle can be advantageously used.

Channeling is usually due to hard and soft spots in the castings, which result from imperfect mixtures of the constituents. The more tin in the mixture the greater tendency to segregation. This may be prevented to some extent by running a mixture made from all new metal into ingots and re-melting it, using at least 1/3 remelt in the mixture. The alloy should not be poured too hot A mixture which is used successfully by a firm of valve makers who have to deal with very sandy and gritty water, consists of: Copper, 100; tin, 17; lead, 3.

Government specifications for whitewashing require the wash to be made as follows: Slack half a bushel of lime in boiling water, covering to keep in the steam. Strain the liquid, and add a peck of salt previously dissolved in warm water, 3 lbs. of ground rice boiled to a thin paste and stirred in while hot, ½ lb. Spanish whiting, and 1 lb. of glue dissolved by soaking in cold water which has been hung over a slow fire in a glue pot. To this mixture add 5 gal. of hot water, stir well and let stand for several days covered from dust. It is better when applied hot.

Of the products resulting from the refining of crude petroleum, 10 per cent. are gasolene and substances of that general character. These oils are all highly volatile, the gases are readily explosive, and their handling is attended by danger. Forty per cent. of the products of petroleum refining is lubricating oil of various kinds. About 17 per cent. is "export oil" which is a low grade of kerosene, unmarketable under the laws of the United States. About 25 per cent. is commercial kerosene as used in this country. About 5 per cent. is lost in refining.

In detailing structural steel work a great mass of cover plates is sometimes added to the flanges of plate girders. This often is done to the extent where it becomes bad practice, for the rivets are so long that a bending strain is put upon them. Six ¾-in. cover plates are about the limit of good practice, and, in fact, when plates of this thickness are added to the flanges of a girder, the holes should always be drilled or reamed rather than punched. With thick plates a point is soon reached where a punch is broken so often that it becomes cheaper to use the more expensive process of drilling. This is especially true where the holes are of about the same diameter as, or of less diameter than, the thickness of the plates.

The phonographic record, made upon a continuous wire by electromagnetism instead of upon a wax cylinder by the indentations of a stylus, is now being manufactured in commercial form and for commercial purposes. In operation, the varying magnetic intensity, produced by the vibration of the voice of the person making the record, is registered upon a wire of iron or other magnetically permeable material. This wire, by its inductive effect, upon being run through the reproducing mechanism, reproduces the words recorded upon it. The action is stated to be even and smooth, and the character of the record is said to have none of the metallic sound which is so often a characteristic of phonographic records made in the ordinary way.

In the case of foundations built upon a yielding stratum such as the mud and soft material found in the neighborhood of many Western cities, it is often necessary to consider the foundation as a floating structure rather than one which carries the load directly to the soil. In these cases it is quite often possible to build the structure as a mat, almost a boat, for it is raft-like when in place and is largely supported by its own buoyancy. This brings up the question—often in ridicule—as to whether the upward pressure (which has to be figured upon in these cases) is not sufficient to cause the building to fly up into the air. Engineers who use this method of figuring are too prone to act as though such were the actual case, which of course reduces an otherwise ingenious and well-considered method of designing to an absurdity.

Much of the steelwork construction about metallurgical plants is in the nature of shed buildings. These are best designed with a monitor over the peak of the roof if it is of gable form. The best proportions for the width of a monitor of this type are determined to a certain extent by the number of panel points in the upper chord of the roof trusses. As a general rule, a width equal to one-fourth the total span is best so far as appearances go. Even if made as wide as one-third the span, the appearance is much better than when made comparatively narrow; and with either of these proportions it is possible to arrange the side members of the monitor construction to come at panel points, which of course is where they should be. The added width of monitor is obtained at an increase of cost so slight as to be almost negligible, on account of the fact that the ends only require additional material. The area of the sides and of the roof needed is the same no matter what the width. Low, flat, roofs of the lean-to type, having a slight pitch, may be arranged for ventilation by leaving the high end open and building in saw-tooth form. This, if a gutter is provided under the eaves at each step, will give excellent results, especially over wide buildings put up for the purpose of protecting furnaces. In this case, however, it is usually important that the roof water be kept away from the furnace.

Colliery Notes.

Ammonia diluted in water, or "strychnine pills," are both powerful reviving agents for restoring anyone who is faint from the effects of afterdamp. Rescue parties are often supplied with these medicines when they undertake to enter a dangerous mine.

The disadvantage of using alcohol in the safety lamp is that it does not give much light and consequently another lamp must be carried to light the way. The alcohol flame, however, is very sensitive and shows a cap when the percentage of gas is very small.

Only under exceptional circumstances should the ventilating system of a mine be changed after an explosion. The entombed miners always rely on their knowledge of the direction in which the air current is moving; so that any reversal of the normal system will drive the gases upon them with disastrous results.

In a mine where the roof is bad, it is criminal negligence on the part of a superintendent to allow short-grained timber, such as oak or beech, to be taken underground for prop use. Such timber besides being heavy, is not elastic and will snap without warning, allowing the roof to catch the miners before they can get away.

It is advisable that every colliery should organize and train a corps of experienced and intelligent miners into a rescue party, to be used in case of an explosion. Each man should be thoroughly familiar with the use of the safety lamp and provided with all necessary equipment, such as life-saving apparatus, medicine for reviving those overcome, etc. Everything should be kept in readiness at a point convenient to the mouth of the mine.

Flat steel ropes from present outlook are not likely to supersede the round steel rope for hoisting purposes. The first cost of the flat rope is greater, it wears faster, weighs more and is harder to repair. The advantage of the flat rope is that it prevents fleeting, and that it is generally built to taper, so that the smallest end is at the cage, where the load is least. Also when the rope is out and the cage at the bottom of the shaft, giving the maximum load to be hoisted, the drum, or rather reel, is of a minimum diameter, and the engine has its greatest leverage to start the load, thus increasing the mechanical efficiency.

It is often necessary to build dams or heavy walls in mines so as to isolate a portion of the workings to protect from water or fire. In building the dam to hold back a column of water, it is best to arch the dam toward the direction from which the pressure comes, and firmly toe it in to the bottom, roof, and side of the entry. A brick wall is considered preferable to stone, especially when two or more separate walls can be built and good concrete filling placed between them. If a stone wall is built, it should have a brick facing. In one case where leakage occurred, the water was pumped out and horse manure placed against the side of the dam, being held there by planks. This proved an effectual stopping and the leakage ceased.

It is believed that spontaneous combustion of coal is principally due to the condensation and absorption of oxygen from the air, which by heating, causes the volatile hydrocarbons, and often the carbon itself, to combine chemically with the condensed oxygen. If there is sufficient air, a high external temperature, and the coal so broken that fresh faces are exposed and afford a ready surface for the absorption of oxygen, then the conditions are favorable for stimulating the process. Another condition that tends to cause the spontaneous ignition of coal is due to the action of moisture on the sulphur in the form of iron pyrites. In both of these cases, a strong current of air will remove the heat, and consequently the danger from either of these causes is lessened.

There has been much discussion for many years as to what rules are acceptable for the correct classification of the various coals. Up until recently the different coals were classed according to their fuel ratio, this ratio being the quotient of the fixed carbon divided by the volatile combustible matter. This method was fairly good, but did not draw the line beween anthracite, semi-anthracite, semi-bituminous, lignite, etc., as closely as was desired. The Government in its testing plant at St. Louis, found by a series of experiments that it was better to classify fuels according to their "carbon-hydrogen ratio." It is not claimed that this classification is sufficiently accurate for final acceptance, but rather that it is an improvement on any scheme heretofore used.

The various safety lamps now used with oil as the illuminating medium, will usually not show a cap when the proportion of gas in the air is less than 2 per cent. and often as high as 2½ per cent. The same lamp, it has been proven, will show a clear cap down as low as 0.15 per cent. when hydrogen is used as the testing flame. The sensitiveness of the lamp can also be increased by using a certain portion of petroleum with the oil, or by the use of alcohol to produce a testing flame. If we introduce a dead black background behind the flame, the cap is rendered more visible. Since our present safety lamps, when using oil, will not detect gas when it forms less than 2 per cent. of the air, it is readily seen that, as the mine has been considered non-gaseous, the addition of an extra small precentage, to the 2 per cent. already present, would be sufficient to bring the atmosphere up to its lowest explosive point. Safety lamps with increased sensitiveness are an absolute necessity, and it is fortunate that such lamps are now being perfected.

A recent compilation of statistics with reference to the cost of diamond drilling, goes to prove how variable is the cost of such work, and how utterly impossible it is to fix anything more than general rules from which an approximate figure of cost can be deduced. Out of 20 holes, drilled through jasper, marble, and iron slate, and varying in depth from 110 to 1100 ft., the average cost was $3.14 per ft. Of this cost, 39 per cent. went for labor, 22 per cent. for carbon, and the remainder for fuel, repairs, supplies, etc. Another series of 16 holes varying in depth from 94 to 390 ft., with an average of 314 ft., showed an average cost of $2.70 per ft. Of this amount, 38 per cent. went for labor, and 13 per cent. for carbons. The cost of drilling in soft schist rock was as low as $1 per ft., of which labor formed 66 per cent. and diamonds 30 per cent. The cost of drilling in hard syenite rock, was twice that of drilling in tough diorite, the cost of the diamonds in drilling the syenite rock, approximated 63 per cent. and the labor 33 per cent.; in the diorite rock, the carbon cost 30 per cent. and the labor 66 per cent. of the total. The speed of drilling varied from 6 to 25 ft. per day, and the holes had a mean diameter of 1¾ inches.

Both blower and exhaust-fan systems of ventilation have their advocates, and each class is ready to substantiate its theory by advancing plausible arguments. Blower fans dam the gas back in the strata, and any slackening of the fan lessens the pressure, causing the accumulated gas to spring out into the airways. On the other hand, an exhaust fan is constantly taking off pressure, and when anything happens to block the intake airway, the pressure is so diminished that the gas responds on the same principle. If the trouble, however, is at the ventilating motor and the fan stops, then the exhaust system has the advantage, for the mine pressure rises and the gases are driven back into the crevices. A stoppage of the blower fan reduces the pressure in the mine, and the mine gases expand into the workings at a time when the results may be most dangerous. Barometric changes affect the mine air less where a force fan is used than where the vacuum system is employed; but so far as we know this advantage is very small. The most important reason that has caused the general adoption of exhaust fans is owing to the necessity of making the intake airway the haulage road, and consequently having it unobstructed by doors. Also in this case the men do not have to work in the gas-laden return air. In the rare case where the mine workings have openings or crevices reaching to the surface, the blower or plenum system of ventilation is essentially best, for in this case each crevice becomes a discharge vent for the gases.

The Handling of Colored Labor.

BY C. S. HERZIG.*

The handling of colored labor is a problem which confronts the mining man in many parts of the world; ranging from the Southern portion of the United States, where the negro speaks the language of his employer, to South Africa, where the different dialects have necessitated the use of a bastard, Anglo-Ethiopian jargon, so that conversation between boss and men is restricted to a very limited number of subjects.

The introduction of Chinese on the Rand must, for a time at least, necessitate the constant use of an interpreter until the Chinaman learns pidgin English. Where there is no common language between the boss and employees the efficiency of the labor is certainly not so great as in cases where the boss can personally make his wishes known to each individual. Either the white man must learn the colored man's language, or *vice versa*. In most cases the colored man cannot speak, or will not learn a European language, so that the employer is forced to learn enough of the native language to make his orders intelligible to the natives. In Malaya, that is the Malay Peninsula and Archipelago, in India, in Spanish America, and in handling the Kafir in South Africa, the white man usually acquires a working knowledge of the native language, although the white boss does not usually learn Chinese or kindred languages.

The handling of large numbers of men, so as to secure their greatest efficiency, is always a serious problem, and the first essential is a means of verbal inter-communication, because instructions to be properly carried out, must be properly understood, and any interpretation through a third person makes mistakes likely. I recall several instances where the stupidity and ignorance of the best interpreters available increased the difficulty of carrying out a certain piece of work to such an extent as to require almost constant personal supervision, which should not have been necessary.

There are several ways of getting good work out of workmen. However, the average day laborer released to any extent from supervision, will do as little work as he thinks his boss will stand for. This is more true of colored labor than of white, although it must be admitted that where the white man lacks the same sense of loyalty, he is very artful in his dodges. On the other hand the hight of a negro's ambition is to have plenty of food and nothing to do but lie on his back and contemplate the heavens through the medium of a shady treetop. If you do not set him a task, he will "lie down" on you, whether he be a nigger with a couple of centuries of American or Spanish civilization at his back, or one just from the bush. There is no one else who can be so contented doing nothing, so satisfied to be idle, as a negro; and this is true of him the world over. The American "darky" cannot understand why the police move him on when he is "jes doin' nuthin."

Colored labor may be sub-divided into several general types of which the following is an arbitrary classification, viz.: 1. The North American negro; 2. The Indian coolie; 3. The African negro; 4. The Chinaman; 5. The Malayan; 6. Other colored races. To these may be added the Mexican and the mixed races of Spanish America, who are not to be classed with the colored people, but yet present some of the same difficulties of management.

This classification aims at a broad geographical distribution of the colored races employed in mining, and while a great many rules have a common application to all, yet the mere fact of their being separated geographically and by difference in language renders it impossible to consider them as a whole.

Although I have had a varied experience in different parts of the globe, I do not feel qualified to discuss the question in minute detail, but hope by this introduction to open a discussion by mining men in different countries with the end of leading to a clearer understanding of the methods adopted for the successful handling of colored labor. I will therefore not attempt to go into a detailed discussion of each of these types, but will rather cite a few instances from my own experience, as a text from which to draw the conclusions which follow.

An out-of-the-way corner in which I have spent some time is German Southwest Africa, a rather desolate region, situate on the West Coast of Africa, just north of Cape Colony. There the German carries a whip when he goes among his employees. Plenty of licking and an empty belly does not make a willing workman, nor does it take into consideration the fact that all aboriginal races are proud. It is their particular brand of pride, but it must not be overlooked.

The German industrial system is based on the initial proposition of master and man. This idea is ingrained in every German, from his youth up, and together with the military system, the bureaucratic methods of the country and the great class distinction, often brings it about that the masters are not always considerate of their employees. Evils arising from such a condition furnish the true element of a native uprising such as is now costing Germany so much in men, money and prestige in Southwest Africa. The Germans, despite their philosophy, forget that the weak can be tyrannized to such an extent, that out of their despair grows the courage for resistance.

In Southwest Africa wages paid to the native range from 8 to 10 marks per month, plus food. The food varies according to the liberality of the native's employer. Usually it consists of a scant pound of rice daily, and in some cases an allowance of milk. Besides this he is supposed to get a small weekly allowance of coffee, sugar, tobacco and schnapps (gin). The wages are rarely paid in cash. Under ordinary circumstances the native must take it out in trade, and as the employer makes a profit on what he sells, the buying power of the wages is greatly reduced. Very often a boy gets an old coat or trousers in lieu of wages. The pound of rice daily is not sufficient food for a man who is on duty 12 to 15 hours, usually from sun up until dark; much less is it sufficient to feed a family on. Is it a wonder that the German has not succeeded with the colored labor problem?

The wrongs inflicted on the American Indian have been a much discussed question. The aboriginal of Southwest Africa presents a different problem, but he has suffered great wrongs at the hands of the German. The red man will not work. His pride forbids it. His squaw is the laboring man of the family. On the other hand the natives of Southwest Africa, i.e., the Herrero, Damara, Namaqua, and Ovambo, will work. Even the Hottentots and bastard races enter into certain occupations; yet the industrial conditions of Southwest Africa are such that there is little or no work for the native, and as the German has taken his land and confiscated his cattle, he has no hope of getting food without work, and as there is none to be had otherwise, starvation is staring him in the face. As long as the women and children were able to dig roots and gather gums and nuts to supplement the pound of rice the Herrero stood it. But when a series of dry years made field food scarce and he and his family began to starve and die of hunger and exposure, he could remember that before the German occupation he owned cattle and sheep. He was still proud despite his poverty, and much whipping and an empty belly did not make his life an easy one to bear. The German considers the nigger of no consequence and treats him with brutality, so that the native, fearing and distrusting him, performs his work, not willingly or loyally, but in a half-hearted sort of way.

My own experience in handling these same natives in Southwest Africa was somewhat different. I took advantage of what I saw and, despite a very short acquaintance with the country, determined to adopt methods other than those practiced by my German friends. The object of my visit was the investigation of an old mine that had been shut down for 40 years or more and the boys (natives) I employed were Herreros and Damaras, many of whom came to me right from the bush clothed only with skins of animals over their loins. They had never even seen miner's tools, much less used them. The advice I received from all sides was to keep wages low and not to

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feed them too well, as they could not stand being generously treated. My observation of the methods of the colonists led me to believe that they could be improved upon and the first principle I laid down was that the natives, if they worked hard, required ample food. You cannot raise steam in a boiler without fuel, nor can you expect great physical exertion without nourishing the body. Further, aboriginals being simple-minded must be treated frankly and honestly and all promises kept, so as to gain their confidence if the best results are to be obtained.

The outcome more than justified my expectations. As a food allowance, each boy that worked his shift received one pound of rice, ship biscuits and fresh meat. Sometimes meal was substituted for one of these. At the end of the week, providing they had worked four shifts, they received an allowance of coffee, salt, sugar, tobacco, matches, and schnapps (diluted gin). I scrupulously kept all promises I made to them, with the result that they trusted me and my word was sufficient. There was no whip about the place; they were punished, when they transgressed, by having a portion of their food allowance cut off. This affected them in their most vulnerable spot and acted like a charm. I also instituted a system of rewards which instilled a very active spirit of rivalry among different boys. In order to carry this out several grades were made with corresponding increase of pay; the best boys were then selected as leaders and received an extra amount of tobacco and sugar. Others who did some special service on any day were rewarded with a piece of tobacco or other similar thing of value. As these favorites remained in favor only as long as they showed their superiority, there was a great straining to keep in the good graces of the boss, as any slackening off was followed by immediate withdrawal of extras and a reduction in grade. My boys were always happy, were exceedingly faithful and willing, and it is surprising how quickly they became proficient with hammer and drill. The head boys vied with each other as to who could get the most work done. They were nearly always on hand long before it was time to go on shift and they certainly seemed to appreciate honest treatment.

The way that Great Britain has treated the labor problem in India has been followed by an immense success. The keynote of this success is that the native has been freed from the exactions of the Rajahs, that his life and property are secure, and he has learned that the "Sahibs" keep their promises. No unimportant matter is that his mode of life has not been interfered with. The Government has stepped in like a big brother, who protects the weaklings and fights their battles for them. It has set in motion a far-seeing and just Government that administers wisely and well, and works so smoothly, that the native respects it and will fight for it.

In the Malay archipelago, the English, Germans, and Portuguese have colonies in the extreme east; the remainder belongs to the Dutch, and outside of Java and Sumatra, the islands are for the most part very little under the influence of the whites. The Dutch have attained a considerable measure of success in handling the labor of the islands, though curiously enough the only dividend-paying gold mine in the whole of the Dutch Indies is managed by an Englishman.

The Dutch treatment of the natives is a queer mixture of broadmindedness and the reverse. They have followed in the foot-steps of the British and freed the natives from the imposition of his rulers; they have established law and order and they have allowed the native freedom of religion and custom. The Dutch believe that christianizing natives does not make better citizens of them, and hence missions are not encouraged. Even in remote districts they send a representative of the Government, who stands for law and order, who acts as magistrate, and who in his way is quite an autocrat. On the other hand, they strive to crush out any individuality a native possesses. He must not presume to address a white man in Dutch, and included among the whites are all grades of Eurasians (mixed-breeds). If instead of the native *sarong* (skirt) he wears European costume, he must in addition wear a cloth draped over his trousers from his waist, and under no circumstances is a native allowed to wear a hat without also wearing a head-cloth. This sort of thing wounds the pride of the better class of native and the remainder follow their leaders. Where they are strong enough they offer resistance as they have in Acheen, the west end of Sumatra, in which district a war has been going on for over 30 years. Yet I am sure if the British took possession of Acheen the natives would lay down their arms. This may sound like international politics and as such out of place in a paper on mining, but what I wish to point out is, that the whole matter rests on the greater liberality of the British treatment of the native races; and that therefore the Englishman gets more willing workers than his Dutch neighbors.

In old times in Java the common people meeting one of the ruling class on the road would have to squat down on the side of the road till the aristocrat had passed. The Dutch have insisted on this obeisance being accorded to all whites. Nowadays the native is beginning to see and learn that a great many of the white men are no better than he is, and he does not pay his homage as willingly as in former times.

In a number of instance in Malaya I have seen a slackness among the workers that could only come from a total misunderstanding of the native character on the part of the bosses. The average Malay is willing and tractable, yet I know of a mine where the white men were afraid to go about without firearms. They had treated the coolies so brutally that they stood in fear of an uprising. The treatment they had meted out was done in accord with their policy of crushing out the native's individuality. The French say "That it is ridicule that kills" and I do not know of any people who are more susceptible to sarcasm than the Malay races; and it is a more potent form of rebuke for them than the lash.

The island of Java furnishes the largest number of coolies to the other islands, although the Chinese from Singapore and Indian coolies are employed to some extent. The Dutch do not like the coolie from British possessions, and the latter have very little love for the Dutch. The Dutch insist on even English speaking coolies speaking nothing but Malay to them, as all languages are barred between master and his men, except Malay. Besides having to learn a foreign language they find that they are not so well treated by their Teutonic as by their Anglo-Saxon masters. The mineral production of the Malay Archipelago is at a low point now, but there are many indications of mineral wealth; petroleum, tin, gold, coal, and copper. These will eventually be developed and the labor question of the islands will assume more serious proportions.

It is interesting to draw a comparison between the methods of the Dutch and British, handling the same class of labor. The Dutchman, with more severe methods, does not get more work out of the coolie than does the British boss, so that the preference of the coolie cannot be laid to that account. The gist of the thing seems to me that under Anglo-Saxon authority he gets more freedom, better pay, better food and less harsh treatment, than he gets from the Dutch.

Considering some of the general questions it may be taken as an axiom that in all parts of the world the white man naturally considers himself the superior of the colored man. This often leads to a total disregard of any feelngs on the part of the niggers. The only way that good results can be obtained is in each case to study the characteristics of the people to be dealt with, and to give them as nearly as possible similar conditions of life and food to what they have been accustomed to at home. Try to make them eat food they do not like and they will resent it. If they are used to eating mealies they will object to the complete substitution of rice. A Chinaman wants his rice and green vegetables; the Malay lives on rice and dried fish; the Mexican wants his frijoles and any amount of white man's food will not content him, without his daily portion of beans, nor

will any of the races under discussion be satisfied if their chief article of diet is missing.

In no country will the colored races perform manual labor if a living is to be obtained otherwise. In the desert country of Northern Mexico nearly the whole population are miners because the region itself is not fruitful except for minerals, and supplies must be imported. As they must have money to purchase food and clothing they work for it. In Southern Mexico and Central America, where the natural products of the country (easily obtained) form the main food supplies of the inhabitants, and where little clothing is required, the native is lazy and labor is scarce. The native does not have to work. His simple wants are easily satisfied and he has no thought of laying up money. All he desires is a living and if he gets it, he is contented and the morrow will take care of itself. Under such conditions you cannot attempt to coerce labor. The men will walk out if you do. I can recall an instance on a mine in South America some years ago, under similar conditions of natural abundance of food. There was plenty of bananas, sugar-cane, and cocoanuts, and on these the native lived. There had never been any white men in the district before the starting of the mining company, and the native was used to one long round of holidays; I believe they had 155 or 160 holidays per annum. One of our prospectors always had boys in plenty, who worked whenever he wanted them to. Another of our men was always having trouble. The latter was used to handling white labor, but could not adapt himself to the conditions of the country. He had not studied the native's character and wanted to mold them after his own fashion. They were independent and proud, and would not work unless it suited them. They could be led but not forced.

In Africa, among the negroes, corpulency is a sign of aristocracy. Some of the native kings and queens are so fat that they can scarcely walk. Yet in other respects they live very little better than any of their subjects. The mainspring of their desire is food, plenty of it, and nothing to do. Witness the Kafirs of South Africa, who go to the mines, work for a few years, and go back to their native villages, get two or three wives to work for them, and they can dream away the remainder of their days in idleness and comfort; the hight of their ambition fulfilled. In America the negro has the same feeling. Many of them, in the South, do not work more than two or three days a week, and one can see them lying on their backs with their hats shading their eyes and sunning themselves like so many alligators, without evincing a sign of life.

I could possibly cite numerous other incidents of a similar character, and despite all I have written it may still be said that I have not touched on the relative efficiency of colored labor versus white, but this is a field so broad that no one man could do justice to it; and I hope that this article will stimulate others to give specific details of their experiences in this direction.

As a result of my experience I should say that the following seven conclusions are necessary for the successful handling of colored labor:

1. A common language so as to render inter-communication easy between the boss and his men.

2. The important question of the proper kind of food and plenty of it.

3. The non-prostitution of native women by the whites.

4. Freedom of native custom and religion.

5. Honest and just treatment of the natives and keeping of promises.

6. The use of a reward system and grading with special privileges based on merit.

7. The stimulating of the native to work by enabling him to secure what he considers luxuries as the result of his labors.

Mineral Production of Norway.

Edward F. Gray, acting British consul at Christiania, in a report, dated March 22, communicates the following:

Copper—The exports of pyrites and copper ore increased considerably in 1905, the former by some 31,000 tons and the latter by about 700 tons. Trondhjem and Bodö are the chief ports for shipping pyrites, the copper ore being mainly exported via Bergen, Haugesund, and Tromsö. The Sulitjelma copper works, east of Bodö, are still being extended, and treated 87,000 tons of ore in 1905. A new smelting furnace is to be erected, the invention of the manager, Herr Knudsen, which is said to effect a saving of 80c. per ton of ore. The copper production at Sulitjelma in 1905 was about 456 tons.

The following figures represent the output of the other mines: Alten, 940 tons export pyrites, with 3.4 per cent copper and 1,310 tons copper ore with 7.7 per cent. copper; a Knudsen furnace is under construction. Röros, 30,000 tons, of which 18,000 tons were smelting ore and 12,000 export pyrites: 706 tons copper produced at the smelting works. The Lyrgen copper works (Birtavarre) in the prefecture of Tromsö, were destroyed by fire; the works are now rebuilt and will be opened shortly. Bosmo works, near Mo., 25,000 tons of pyrites. Kjöli mine, 27,000 tons of pyrites. Killingdal mine, 11,600 tons of pyrites. At the Meldalen deposits a railway is under construction, and in two years time it is hoped to be able to export 60,000 tons of pyrites and copper ore annually, and considerable works are expected near Röstvangen, when means of transport are completed. Norwegian sulphite-cellulose factories have now begun to use Norwegian pyrites instead of importing Italian sulphur. In 1905 the consumption of five Norwegian sulphite mills was about 20,000 tons, and seven mills have contracted for 32,000 tons from the autumn of 1906. About equal quantities are said to have been ordered by Swedish sulphite factories, besides about 30,000 tons pyrites for sulphuric acid works.

Nickel—At Evje nickel works 4639 tons of ore were smelted, producing 190 tons nickel-copper matte, containing 78.6 tons of nickel and 51.1 tons of copper, or rather more than in 1904.

Silver—The production of silver at the Kongsberg mines in 1904-05 was about 7½ tons as compared with about 8 tons in 1903-4, and an average of some 6 tons per annum in the immediately preceding years.

Iron—About 44,000 tons of iron ore were exported from Fehns mines near Ulefos, and about 14,000 tons out of 17,000 tons produced at Melö mine in Tromsö prefecture were also exported. Of the total amount of Swedish ore from the Kirunavara Company exported from Narvik in 1905—1,452,778 tons—923,350 tons went to Germany, 399,884 tons to the United Kingdom, 73,915 tons to Belgium, 45,766 tons to France, and 9,863 tons to America. In 1905, 63 per cent. of the total export went to Germany, which is the chief consumer of phosphorus ore, and 27 per cent. to the United Kingdom, chiefly bessemer ore.: The Tulloavara company also shipped 35,047 tons iron ore from Narvik in 1905, mostly to south Sweden.

Molybdenite is now being exported to the United Kingdom, the deposits near Flekkefjord having been sold to a British company. The production in 1905 was about 20 tons ore with about 95 per cent. molybdenite. A deposit is also said to have been worked above Egersund during the year.

Coal in Indo-China.

The most important coal mines in Indo-China are those at Hongay, owned by the Societé Francaise des Charbonnages du Tonkin, which employs about 3000 workmen, Chinese and Annamites. The financial position of the Societé is very flourishing. During 1904 the coal extracted was 230,980 tons, of which 106,289 tons were manufactured into briquets, some of which were shipped to Hong Kong. Another mine, the Kebao, is worked by Chinese and Annamite contractors. The output of the Kebao mine is about 6000 tons yearly. The Schoedelin mine has been worked by contract since October, 1902, by the Heritiers Sarran. The approximate output is 5000 tons a year. The coal is of fair quality, but friable, and will not stand handling or storage.

New Publications.

"Types and Details of Bridge Construction, Part II." By Frank W. Skinner. Pp. 412; illustrated. 6x9 in.; cloth, $4. New York, 1906: McGraw Publishing Company.

Contents: General features of design, construction and service. Examples of railroad plate girder spans. Details of bearings and splices. Multiple railroad spans on steel towers. Highway and special spans. Discussion of plate girders.

This is the second part of a series of articles on modern bridge practice. Much of the matter contained is reprinted from the pages of the *Engineering Record;* other material has not heretofore appeared in print. The book is good, though it deals rather more with actual practice than with the calculation and design of such structures. Herein is where its principal value lies; in the descriptive articles much attention is given to detail, and the book is, practically, a record of progress.

"Clays, Limestones, and Cements." By G. P. Grimsley, Assistant State Geologist. Pp. 565; illustrated. 6x9 in.; cloth, $1.50. Morgantown, W. Va., 1906; West Virginia Geological Survey.

Contents—The origin of clays. Chemical properties. Classification and uses. Technology of the clay industry. Topography and geology of West Virginia. Description of the West Virginia clay industry and the geological horizon of the beds. The river clay industries of West Virginia. Physical tests on West Virginia building and paving brick. Sand-lime brick. Statistics. Distribution and properties of lime in minerals and rocks. Limestones of West Virginia. Technology of lime manufacture. Uses of limestone and lime. Classification, history and composition of cement. Progress of manufacture of portland cement. Testing of cement and cement specifications. Cement mills in West Virginia. The portland cement resources of West Virginia. The uses of portland cement.

Professor Grimsley has devoted practically all of his time and energy to the preparation of this work, since he became connected with the West Virginia Geological Survey, in September, 1904. His work appears to have been very well done, and the report is especially valuable, because of the great extent to which it goes into the technology of the industries to which it relates. It may well be considered a technical treatise on the manufacture of clay products, lime, and cement, with especial reference to these products in West Virginia, and as such it will be a useful work for reference.

The plant (silver-lead smelting) of the Tasmanian Smelting Company, in Tasmania, is being increased. A third blast furnace, capable of treating 100 tons of ore per day, is in course of erection.

Professional Papers.

Blast vs. Reverberatory Furnaces. E. P. Mathewson. *Min. and Sci. Pr.,* Mar. 24, 1906. Pp. 197.

Pig Iron, The constitution of. P. Goerens. *Stahl u. Eisen,* Apr. 1, 1906. Pp. 397-400; illustrated.

Aerial Transport, in Mine and Smelter Practice. G. Dieterich. *Stahl u. Eisen,* Apr. 1, 1906. Pp. 380-388.

Phosphorus and Sulpho-Phosphor Compounds.. A Siemens. *Chem. Zeit.,* Mar. 24, 1906. Pp. 263-264.

Calcium Borate, The Argentine Deposits of. Fr. Reichert. *Chem. Zeitung,* Feb. 21, 1906. Pp. 150-152.

Electric Transmission Lines, Voltage and costs of. Alton D. Adams. *Cassier's Mag.,* Mch., 1906. Pp. 430-432.

Explosions, The pressure of. J. E. Petavel. *Engineering* (London), Mar. 30, 1906. Pp. 429-433; illustrated.

Engineering, Geology in relation to. Stanley C. Bailey, *Engineer* (London), Mar. 30, 1906. Pp. 313-314; illustrated.

Aberdare Collieries, Electrical Equipment of. Charles P. Sparks. *Electrician* (London), Mar. 30, 1906. Pp. 962-966; illustrated.

Alluvial Gold Deposits, of the Amgun District, in the Coast Province of Eastern Siberia. Ernst Maier. *Zeit f. Prak. Geol.,* Apr. 1906. Pp. 101-129; illustrated.

Abstracts of Official Reports.

Anaconda Mining Company.

The profits for the year 1905 were $5,718,828, equal to 19.06 per cent. on the $30,000,000 capital stock; the gross receipts were $23,734,203, and the surplus now stands at $7,240,572, equal to 24.13 per cent. on the company's stock.

The profit and loss account for the year ended December 31 is as follows:

Sales of copper, silver and gold	$17,429,098
Royalties	65,441
Dividends on investments	32,100
Rental of water rights	50,000
Miscellaneous receipts	96,285
Net profits subsidiary departments, deducting depreciation	300,174
Copper, silver and gold on hand	5,761,105
Total receipts	$23,734,203
Copper, silver and gold on hand beginning year	$6,336,427
Mining expenses, development and depreciation	5,403,585
Ore, matte and copper purchases, transportation and purchasing expenses	349,258
Transportation ore from mines to reduction works	226,515
Reduction expenses at Anaconda, including depreciation	4,046,822
Transportation of metals from West to East, refining and selling expenses	1,729,175
Administration expenses	54,699
Total	$18,146,481
Balance	$5,587,722
Add interest	131,106
Balance profit	$5,718,828

The mines were developed during the year to greater depths than have been reached heretofore in the Butte district, and with the increased depths the life of the mines and grade of the ore are assured for many years to come. The Anaconda mine is now opened on the 2400-ft. level and the Never Sweat and St. Lawrence on the 2200, and at these depths the veins show fully as well in size and in value of ores as in any of the levels below the 1000-ft. The mining properties owned by the company outside of the working mines have been developed to a considerable extent during the year with satisfactory results, and it is the policy of the management to continue, especially during prosperous times, active work in developing the large holdings of the company that are not now productive.

The arrangement under which the company leased the new reduction works of the Washoe Copper Company and abandoned and dismantled its own reduction works at Anaconda has been in effect long enough now to demonstrate fully its wisdom. During the year 1905, 1,626,306 tons of ore from the company's mines and slags, slimes and flue-dust taken from the old works were treated at the new reduction works, at a difference, after paying rental, of $1.5886 per ton in increased savings of metal values and decreased costs as compared with the old works in the last year of their operation. This saving amounts to $2,583,549 on the ore treated for the Anaconda company during 1905. In addition to the advantage of increased savings and decreased costs realized under the new arrangement there has been recovered in salvage and from metal values in the dumps at the old works since they were abandoned $3,645,625 net profit to March 1, 1906, and the cupreous material yet in sight at the old works is estimated at about $1,750,000, or, with net profits already realized, about 85 per cent. of the book value of the old works when they were in operation. Included in the book value of the old works is the refinery plant, which still stands intact and ready for operation, but the company does not continue its operation, as contracts have been made with refineries at the seaboard that make it more profitable to ship the product and have it refined at the seaboard than to refine it at Anaconda.

The mines in operation during the year were the Anaconda, Never Sweat, St. Lawrence, Mountain Consolidated, Bell, Diamond and High Ore. The Gallatin and J. I. C. were opened and operated and a limited tonnage taken from them in the latter half of the year. The mines of the company produced 1,543,316 wet tons of ore, of which 61,149 dry tons of smelting ore remained on hand at the reduction works at the close of the year, 1,470,694 dry tons having been treated at the works. The use of electrical power will continue to increase at the mines, effecting a very considerable saving over power generated with coal. The reduction works treated for all companies during the year 2,650,868 tons of ore and

other cupreous material; of this, 1,470,694 tons of ore from the mines, 44,566 tons of slimes, 23,900 tons of flue dust, 82,789 tons of slag and 4357 tons of miscellaneous cleanings from the old works were treated for the Anaconda company, from which was produced 95,443,730 lb. of fine copper, 3,116,881 oz. of silver and 19,165 oz. of gold in the form of anodes, which were shipped to Eastern refineries.

During the year the Washoe Copper Company added to the blast furnace capacity of the works by making connections between furnaces and reconstructing the plant, so that three large furnaces and one small one are now in operation with a daily capacity of 4700 tons of all material, as against seven small furnaces with a daily capacity of 2700 tons at the beginning of the year. Eight new McDougall roasting furnaces were added in the calcining plant and it is intended by the Washoe company to add still more roasters, as the present product of the concentrator is greater than can be satisfactorily handled with the present capacity. The small reverberatory furnaces have all been replaced by large ones, and the reverberatory plant now consists of two furnaces 100 ft., four 112 ft., and one 115 ft. long, with boilers in flues of all the furnaces, furnishing steam about sufficient to operate the smelter power house. The concentrator is being equipped with electric power, which will show a material decrease in the costs of operating when installed. These extensions and improvements are being made by the Washoe Copper Company, and the Anaconda company will pay increased rental based on the increased cost of the plant.

The general balance sheet as of December 31, 1905, shows assets, including lands, mines, etc., $20,430,757; invested in other companies, buildings, machinery, etc., $4,799,076; supplies, water, etc., $1,508,761; Deferred assets, $1,564,840; prepaid insurance, $56,079; copper, gold, silver and merchandise on hand, $6,389,596; cash and accounts receivable, $6,749,605; total, $39,933,874. Accounts payable amount to $1,626,286, and $1,067,106 was distributed in dividends from the year's profits.

Wallaroo & Moonta.

The 16th annual report of the Wallaroo & Moonta Mining and Smelting Company, Ltd., South Australia, for the year ending Dec. 31, 1906, states that the profit for the year, was £30,708. The expenditure necessitated by the fire has been much greater than was anticipated, and, so far as repairs to levels and stopes are concerned, it is not likely that these will be fully completed before the end of 1906. A good profit was realized from the cementation works at Moonta mines, and the alterations to the sulphuric acid works resulted in a largely increased production, and a correspondingly increased profit.

The total ore produced from veinstuff by separation and by dressing was as follows:

WALLAROO MINES.	1905.	1904.
Ore produced	35,189 tons net	21,766 tons net
Fine copper in ore	3,283 tons	2,330 tons
Percentage of dressed ore	9.33	10.71
MOONTA MINES.		
Ore produced	8,161 tons net	6,686 tons net
Fine copper in ore	1,187 tons	1,780 tons
Percentage of dressed ore	14.52	16.66

The cementation process produced as follows:

AT MOONTA MINES.	1905.	1904.
Precipitate produced	869 tons net	922 tons net
Fine copper in same	668 tons	730 tons
Percentage of precipitate	76.84	79.18
AT WALLAROO MINES.		
Precipitate produced	61 tons net	27 tons net
Fine copper in same	44 tons	21 tons
Percentage of precipitate	73.15	78.60

The following is the result of operations (apart from cementation) at each mine, and at both combined:

	Wallaroo	*Moonta*	*Both*
Mining cost per ton of copper	£40 4 6	£49 6 0	£42 12 8
Smelting cost per ton of copper	18 2 4	15 4 2	17 6 8
Shipping charges p. ton of copper	0 15 6	0 15 6	0 15 6
Interest per ton of copper	0 8 6	0 8 6	0 8 6
Adelaide expenses per ton of copper	0 7 8	0 7 8	0 7 8
	£59 18 6	£66 1 10	£66 11 0
Average acct. sales realization of copper for the year	73 9 9	73 9 9	73 9 9
Profit	£13 11 3	£ 7 7 11	£11 18 9
	On 3283 tons, = £44,526	On 1187 tons, = £8,779	On 4470 tons, = £53,360

The increased cost per ton of copper was largely due to the higher wages paid to the men in accordance with the sliding scale established in June, 1903, under which they were paid, during 1905, a bonus of 10 per cent. on their earnings for the month of January, and 15 per cent. for the rest of the year. The cost of producing 668 tons of fine copper at Moonta mines by the cementation process was as follows: Working costs per ton of copper, £23 3s. 3d.; smelting and shipping costs, £7 2s. 1d.; cost per ton of copper f. o. b. steamer, £30 5s. 4d.

At the Moonta mines the workings on the western lodes have been abandoned as unprofitable, and the water allowed to rise. The North Yelta mine, after having being long closed down, is now being unwatered with a view to testing its value under the improved conditions of ore treatment and a higher price for copper.

The smelting works treated during the year the following quantities: Wallaroo ore, 35,452 tons; Moonta ore, 8,425 tons; Hamley ore, 1,200 tons; sundry ore, 1,673 tons; copper matte, 2,278 tons; Moonta precipitate, 872 tons; Wallaroo precipitate, 61 tons; total 49,961 tons; and the following metals were produced: Refined copper, 6,501 tons; gold, 1,646 oz.; silver, 4,781 oz. There were also produced: 15 tons blister copper, containing 14 tons fine copper, 101 oz. gold, and 838 oz. silver. The quantity of bluestone made was 340 tons. The production of sulphuric acid was 5,312 tons; the cost of manufacture, exclusive of the usual 10 per cent. depreciation written off, was 10s. 10. 7d. per ton.

Patents Relating to Mining and Metallurgy.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications, correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ended May 22, 1906.

821,163. TUMBLER FOR BUCKET ELEVATORS.—James H. Gray, San Francisco, Cal. Filed March 22, 1905.

821,189. PROCESS OF SMELTING ORES.—John A. Potter, San Francisco, Cal. Filed June 27, 1905.

821,190. APPARATUS FOR SMELTING ORES.—John A. Potter, San Francisco, Cal. Filed June 27, 1905.

821,325. BEARING FOR ROCK DRILLS.—Thomas E. Adams, Cleveland, Ohio. Filed June 7, 1905.

821,330. PROCESS OF SMELTING LEAD SULPHIDE ORES.—Anson G. Betts, Troy, N. Y. Filed May 20, 1904.

821,372. APPARATUS FOR MOVING AND MINING MATERIAL OF A GRANULAR AND COMMINUTED NATURE.—Aexander McDougall, Duluth, Minn. Filed July 25, 1902.

821,413. EXCAVATING MACHINE,—John Helm, St. Louis, Mo. Filed April 10, 1905.

821,430. ORE SEPARATOR.—Albert Perry, Caribou, Colo. Filed July 14, 1904.

821,489. SMOKE MACHINE. — George W. Heiland, New York, N. Y. Filed April 10, 1905.

821,500. WATER-COOLED GRATE.—Alfred E. Johnson, Denver, Colo., assignor to The Johnson Furnace and Engineering Company, Colorado Springs, Colo. Filed Dec. 2, 1904.

821,514. ORE VESSEL.—Alexander Leslie, Walkerville, Canada, assignor of one-half to George E. Titcomb, Philadelphia, Pa. Filed Dec. 7, 1904.

821,516. PROCESS OF RECOVERING COPPER AND OTHER VALUES FROM CERTAIN ORES.—Thomas J. Lovett, Chicago, Ill. Filed Jan. 16, 1906.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy.

Week ended May 12, 1906.

7916 of 1905. PURIFICATION OF SULPHURIC ACID.—The United Alkali Company, Ltd., Liverpool. Removing arsenic from sulphuric acid by adding hydrochloric acid and blowing air through.

8382 of 1905. COAL CUTTER.—H. Baddeley, G. E. Stringer and J. Dugdale, Wakefield. In coal-cutting machines of the disk type, improvements in the method of fixing, reversing and re-fixing the cutters in the periphery of the disk.

22,224 of 1905. FURNACE VALVE. — R. Schneider, Sharon, Pennsylvania. Improvements in reversible valves used in smelting furnaces, regenerative gas furnaces, etc.

24,486 of 1905. REFINING MATTE.—N. V. Hybinette, New York. For separating copper and nickel from matte, grinding and roasting to remove sulphur, and then alternately leaching several times with dilute sulphuric acid and heating to a temperature at which anhydrous sulphates decompose, thus gradually removing the copper and leaving nickel behind.

24,733 of 1905. PRODUCTION OF HYDROCHLORIC ACID.—I. L. Roberts, New York. The production of hydrochloric acid by the union of hydrogen and chlorine, given off at the poles, when solutions of sodium chlorides are electrolysed.

Personal.

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

F. J. Schafer, of Chimbote, Peru, is visiting New York.

R. Gilman Brown is making a visit of inspection at Ymir, B. C.

Leo Von Rosenberg returned to New York from Arizona this week.

O. H. Fairchild is at present making some examinations in eastern Nevada.

James J. Brown has returned to Denver and Leadville, Colo., from New York.

Edwin E. Chase, of Denver, is at present on professional business in Montana.

Wilbur E. Sanders, of Helena, Mont., is investigating mines in Washington and British Columbia.

Henry G. Heffron, manager of the Gold Roads mine near Kingman, Arizona, was in Salt Lake recently.

D. C. Tobin, superintendent of the Continental gold mines at Vulcan, Colo., was a recent visitor to Denver.

R. C. Shaw has gone to Miramar, Costa Rica, to take charge of the Montezuma mines as general manager.

J. Langeloth has returned to New York, after a long trip, chiefly in Mexico and British Columbia.

H. G. Shuck, of Central City, Colo., is making a visit to Boston and other Eastern cities, on mining business.

J. Lippman, of New York, has been at Central City, Colo., looking after interests in the Gold Leaf Company.

H. DeC. Richards, whose address is still at the Cosmos Club, San Francisco, is in New York on a brief visit.

H. G. Murray left San Francisco May 25 for Java, to take charge of mining operations for an English company.

Eugene Meyer, Jr., a director of the Boston Consolidated, visited the mines of that corporation in Bingham this week.

A. H. Wethey, manager of the Clark mines and smelter in Butte, is visiting the mining districts of southern Nevada.

B. V. Nordberg, vice-president of the Nordberg Machinery Company, of Milwaukee, spent a few days in Butte recently.

W. W. Barton, manager of the Great Boulder Main Reef mine in Western Australia, has resigned and is expected in Mexico.

P. P. Rooney, of New York, has been examining mining property in Gilpin county in the interests of Eastern stockholders.

Clarence K. McCornick, of Salt Lake, has gone to Paris to confer with the French interests in the Gold Roads mine in Arizona.

Homer Hudson, of Xenia, Ohio, has been in Gilpin county, Colorado, looking after interests in the Black Hills & Denver Company.

Charles E. Dinkey, general superintendent of the Edgar Thomson Steel Works of the Carnegie Steel Company, Bessemer, Penn., has sailed for Europe.

Albert Frank, chief engineer for the Heinze interests, has returned to Butte from Bingham, Utah, where he spent a few weeks inspecting property.

Reginald W. Petre, of Baltimore, has been appointed manager of the Colonial Copper Company's mines at Cape O'Or, Cumberland county, Nova Scotia.

G. W. Huddleston, of New York, and J. H. Brandes, of Denver, have gone to London in the interest of the Continental gold mines, of Vulcan, Colorado.

James P. Colp, formerly of Salt Lake City, is now at Monumental Falls, Cal., having been appointed superintendent for the Arden Falls Mining Company.

E. H. Nutter has resigned the superintendency of the Standard Consolidated mine at Bodie, Cal., and has gone to the Liberty Bell mine near Telluride, Colorado.

G. D. Doveton, of Doveton & Purington, is at present engaged at Vantrent, California, upon metallurgical examinations on behalf of the American Smelters' Securities Company.

J. C. Ralston, mining engineer, who has been at Spokane, Wash., since the recent calamity at San Francisco, has returned to the Coast, and has opened an office at 464 Eleventh street, Oakland.

John C. Fleschhutz, of Central City, Colo., manager of the Pewabic Consolidated Gold Mines Company, has gone to California to examine mines in the interests of Eastern people.

George F. Knapp, for a number of years manager of the sales department of Oglebay, Norton & Co., Cleveland, Ohio, dealers in iron ores, has resigned to open an office in Cleveland as consulting engineer.

George K. Fischer, mechanical and consulting engineer for the United States Smelting, Refining and Mining Company, was in Salt Lake recently after a visit to the Nevada properties of that corporation.

J. A. Durfee, superintendent of the Ensley, Ala., plant of the Tennessee Coal, Iron and Railroad Company, will succeed C. S. Robinson as general manager of the Colorado Fuel and Iron Company at Pueblo, Colorado.

Walter McDermott, of London, was married to Miss Hilda McEwen on April 26. Some time ago the American friends of Mr. McDermott, whose name is legion, sent him formal congratulations upon the approaching event.

David T. Croxton, who has been general manager of the Cleveland Furnace Company, Cleveland, Ohio, since its organization, was recently elected president of the company, succeeding D. B. Meacham, of Cincinnati, who becomes vice-president.

D. P. Van Fleet, of Denver, formerly in charge of the D. H. Moffat mining interests in the Cripple Creek district, has accepted the position of superintendent of the Black Hills & Denver Gold Mining Company property at Tolland in Gilpin county, Colorado.

Warner Shook, superintendent of blast furnaces at Ensley, Ala., for the Tennessee Coal, Iron and Railroad Company, has been elected general manager of the Central Iron and Coal Company, which has a blast furnace at Holt, in Tuscaloosa county, Alabama.

C. S. Herzig, who during the last three years has been Bewick, Moreing & Co.'s representative in Eastern Australia, is now proceeding to London after spending three weeks in the West Australian goldfields, and will in future be connected with the London office of his firm.

F. H. Mason, who until lately carried on a consulting mining and metallurgical business at Halifax, Nova Scotia, has sold the goodwill of the same to A. L. McCallum, late of the Dominion Steel Company. Mr. Mason is now at Johnsville, Plumas county, California.

Osmond E. LeRoy, of the Geological Survey Department of Canada, is at Vancouver, British Columbia, outfitting for a geological and topographical examination of the country in the vicinity of the coast line from Burrard inlet northwards, and of neighboring islands. Mr. LeRoy recently returned from China.

Jacob Langeloth, of New York, president of the American Metal Company, lately paid another visit to the mines and smelter, in the Boundary district of British Columbia, of the Granby Consolidated Mining, Smelting and Power Company, of which he is president. Mr. Langeloth proceeded to British Columbia from Cananea, Mexico, where he had been looking over mining properties.

Obituary.

G. A. Wentworth, the author of many successful mathematical textbooks, and a teacher of long service, died suddenly on May 24. He was formerly professor of mathematics at Phillips Academy, Exeter, N. H. He is known, among other achievements, for his reform in teaching geometry by the wise use of the new symbolism which did away with the cumbrous language of the older testbooks. He was 71 years of age.

Nathaniel Witherill, of New York, died at Bad Nauheim, Germany, on May 22, in his 64th year. He was born in Brooklyn, being a descendant of the Rev.

William Witherill, who settled in Massachusetts in 1634. Mr. Witherill organized the Kansas City Smelting and Refining Company in 1880 and was president of the International Metal Company until it was consolidated with the American Smelting Company, of which he was a director at the time of death. A few years ago he retired from active business.

Colonel W. J. Engledue was found dead at Tavistock, England, May 15, shot through the head, the circumstances undoubtedly pointing to suicide. The colonel had been for many years, since his retirement from the Royal Artillery, identified with mining. He was connected with West African mining operations, long before that district became fashionable on the London Stock Exchange. In America he was known chiefly from his interests in the Lake of the Woods district, Canada, of which the Mikado mine was the most important. Unfortunately most of his speculations turned out badly. In fact, he was an example of the type of director often referred to in our columns, a man successful in his own profession, but at sea in mining matters. In spite of these shortcomings, he was an "officer and a gentleman," and in his financial failures he was always the heaviest loser himself. Broken fortunes and ill health account for the manner of his death.

The Australian Mining Standard says: "An old Victorian Minister for Mines, and a still older political identity, passed on April 23, in the person of Wm. McLellan, who for nearly 40 years sat in the Legislative Assembly as member for the mining constituency of Ararat. Mr. McLellan was a digger himself when he was first elected in 1859, the time when the Canton, the Deep Lead, the White Patch, and the Mullock-bank, were returning gold in such large quantities. Mining had not then passed the whip, windlass, whim, tub, cradle and tin dish stage, and the coach journey to Melbourne extended over two days. During his long term of political service, Mr. McLellan was twice Minister for Mines, and his intimate knowledge of the industry materially helped him in administering his department, and in meeting the expanding requirements of mining life. He was a man highly respected in private and political life for his honesty and straightforwardness."

Societies and Technical Schools.

American Society of Civil Engineers—The thirty-eighth annual convention will be held at the Frontenac, Thousand Islands, Frontenac, N. Y., June 26-29. There will be sessions for reading of papers, discussion, etc. Charles S. Gowen is chairman of the committee of arrangements.

Washington University, St. Louis—In view of the necessity of removing the coal-testing plant, established by the Geological Survey, from Forest Park in St. Louis, Washington University, in that city, has offered seven acres of land as a site for the plant. This will give plenty of room for storage, as well as for the plant itself. The decision rests with the Geological Survey.

Montana State School of Mines—Charles H. Bowman, Professor of Mathematics in this school at Butte, has been elected president of the institution, succeeding Nathan R. Leonard, who resigned the position last January. President Bowman was graduated in 1894 from the State University of Iowa. He has been not only a teacher, but has also had the benefit of practical experience, having served several years with the Morgan-Gardner Electrical Company, of Chicago.

American Foundrymen's Association—The eleventh annual convention will be held in Cleveland, Ohio, June 5, 6 and 7. Elaborate provision has been made for a working exhibit of foundry specialties, under the auspices of the foundrymens' supply houses. The official program issued in Cleveland at the time of the convention will give this more fully.

The following topics for discussion have been suggested during the various sessions, if time allows:

(1) Have you any suggestions regarding needed improvements in appliances for tempering, riddling and conveying of sand in the foundry?

(2) What is the best sand for heavy, medium, and light green sand castings, and where do you obtain it?

(3) What brand and grade of firebrick have you found best to withstand the temperature of the cupola as well as the abrasion by the stock?

(4) What proportion of your apprentices of the last twenty years have taken full advantage of every opportunity to perfect themselves in their art? What is the cause of the failure on the part of those that have not?

(5) Are there radical differences required in the skill, and ability to successfully manage specialty shops or those making strictly one kind of casting; as against the regular jobbing shop?

Industrial.

Charles T. Allen has retired from the position of treasurer of the Union Steam Pump Company at Battle Creek, Mich., and has sold his interest in the company. L. B. Anderson is now treasurer.

The Merralls Machinery Company has established a branch office in London to take care of a growing demand abroad. The office is at Salisbury House, London Wall, and is in charge of Charles B. Woodrow.

The Stanley-G. I. Electric Manufacturing Company's San Francisco office, which is now occupying temporary quarters in the Blake block, will be removed next week into the Atlas building, Mission street, San Francisco.

The Penn Hardware Company, Reading, Penn., is installing a 150-h.p. Koerting gas engine to be run on producer gas furnished by a Koerting suction producer. The entire plant is supplied by the De La Vergne Machine Company, New York.

A 500-ton per day capacity cyanide gold mill is reported sold by Fairbanks, Morse & Co. The entire plant will be operated by Fairbanks-Morse direct-current dynamos and motors, driven by water power; a 240-ft. head of water being available at this point. The mill will be near Boulder, Colorado, and will contain features of novelty and interest.

In the recent Courrieres mine disaster, the Westphalian rescue party under directors Meyer and Koch used the "Evertrusty" shamrock oxygen rescue apparatus, with much success. The apparatus is light and compact, and requires no hood or helmet. It is largely used on the continent of Europe. The manufacturers are Wallach Brothers, 57 Gracechurch street, London.

The engineering firm of W. S. Barstow & Co., has been incorporated with offices at 56 Pine street, New York, and Failing building, Portland, Oregon. Mr. Barstow has now secured the co-operation in the new company of J. B. Taylor, late with Westinghouse, Church, Kerr & Co., and R. L. Donald, late with the Southern Pacific Railroad. The company will undertake the designing and construction of electric lighting, railway and power plants and distributing systems; the designing and construction of industrial plants; supervision and management of electrical properties; special reports and examinations.

The Abner Doble Company, engineer and water-wheel manufacturer, of San Francisco, announces that temporary offices have been opened up at the residence of President W. A. Doble, Broadway, between Scott and Devisadero streets, San Francisco. Immediately after the fire steps were taken to erect the permanent shops of the company on the block bounded by Seventh, Hubbell, South and Sixteenth streets, in the Potrero District, where the company had planned previous to the fire to erect large shops and warehouses. Work on the new shops has already been started, and the company is rapidly getting into shape to carry to completion the large contracts which it has on hand. Prominent among these orders is that with the Government of Kashmir, British India, for the complete hydraulic installation of the Jhelum river power plant.

Trade Catalogs.

Receipt is acknowledged of the following trade catalogs and circulars:

The Bucyrus Company, South Milwau-

kee, Wis. Pp. 10, illustrated; paper, 5x8 in. 1905.

The Bucyrus Company, South Milwaukee, Wis. Placer dredge machinery. Pp. 47, illustrated; cloth, 8x12 inches.

Ingersoll-Rand Company, New York. Air appliances for railway service. Pp. 19, illustrated; paper, 3x5 inches.

Murray Iron Works, Burlington, Iowa. Catalog No. 56, Murray Corliss Engines; Pp. 72, illustrated; paper, 9 by 12 in.

Milton L. Hughes & Co., 324 Dearborn street, Chicago, Ill. Catalog, Little Economies; Pp. 16, paper, 4 by 9 in.

Frank B. Gilbreth, 34 West Twenty-sixth street, New York. Repeat orders. Fp. 19, illustrated; paper, 7x9 inches.

The Bucyrus Company, South Milwaukee, Wis. Catalog No. 2. Dipper dredges. Pp. 45, illustrated; cloth, 8x12 inches.

The Bucyrus Company, South Milwaukee, Wis. Catalog No. 1. Steam shovels. Pp. 29, illustrated; cloth, 8x12 in. 1905.

American Locomotive Company, New York City. Pacific type passenger locomotives. Pp. 48, illustrated; paper, 6x9 inches.

Ingersoll-Rand Company, New York. Bulletin No. 2006. Imperial pneumatic hammers. Pp. 15, illustrated; paper, 6x9 inches.

John A. Traylor & Co., Denver, Colo. Pamphlet, The Traylor Centrifugal Pumps; Pp. 4, illustrated; paper, 9 by 11 in.

Allis-Chalmers Company, Milwaukee, Wis. Bulletin No. 1412, Crushing Rolls; Pp. 52, illustrated; paper, 8 by 11 in. Mar., 1906.

Baldwin Locomotive Works, Philadelphia, Pa. Catalog No. 55. Walschaert's valve gear. Pp. 27, illustrated; paper, 6x9 in. 1906.

Crocker-Wheeler Company, Ampere, N. J. Bulletin No. 65. Core type transformers. Pp. 7, illustrated; paper, 7x10 in. April, 1906.

Crocker-Wheeler Company, Ampere, N. J. Bulletin 64, Motors and Generators; Pp. 16, illustrated; paper, 8 by 10 in. Apr., 1906.

Sullivan Machinery Company, Chicago, Ill. Bulletin 48-F. Sullivan continuous coal cutter. Pp. 16, illustrated; paper, 6x9 in. April, 1906.

Greenaway Company, 100 William street, New York City. Catalog, Greenaway Steam Specialties; Pp. 78, illustrated; paper, 7 by 8 in.

Detroit Leather Specialty Company, 25 Beecher avenue, Detroit, Mich. Catalog, Wear Well Leather Packings; Pp. 32, illustrated; paper, 7 by 10 in.

Sprague Electric Company, 527-531 West 34th street, New York City. Catalog, No. 312, Electric Fans; Pp. 31, illustrated; paper, 7 by 10 in.

Niles-Bement-Pond Company, 111 Broadway, New York City. Catalog No. 12, Progress Reporter; Pp. 19, illustrated; paper, 9 by 12 in. May, 1906.

Bristol Company, Waterbury, Conn. Bulletin No. 38, Bristol Portable Recording Pressure Gage; Pp. 4, illustrated; paper, 8 by 11 in. April, 1906. Bulletin 39, Price List; Pp. 2, illustrated; paper, 4 by 7 in.

Ingersoll-Rand Company, 11 Broadway, New York City. Form 74-A, Compressed Air Pumping System; Pp. 24, illustrated; paper, 4 by 6 in. Form 35-D, Air and Gas Compressors; Pp. 19, illustrated; paper, 6 by 4 in. Catalog R. 10 A, Imperial Type X Air Compressors; Pp. 32, illustrated; paper, 6 by 9 in.

Construction News.

Gadsden, Alabama—The Costello Mining Company proposes to begin work at the old Citico iron mine, and will need machinery. Frank Costello, Gadsden, is manager.

Pennsboro, West Virginia—The Helen Coal Company is preparing to open a coal mine, and will need machinery. E. B. Hill is general manager, with office at Pennsboro.

Anniston, Alabama—The Central Coal and Coke Company is preparing to open a coal mine and build coke ovens. J. A. Gaboury, of Jacksonville, Fla., is in charge of the project.

Friendsville, Maryland—The Penn-Garrett Coal Company is opening a new mine, and will need equipment and power plant. H. M. Van Zandt is general manager, with office at Friendsville.

Iola, Montgomery County, North Carolina—At the Golconda gold mine it is proposed to put in additional stamps and other machinery. O. M. Allen, Jr., Washington, D. C., is manager.

Ruby Camp, Okanogan County, Washington—The Arlington Mining Corporation is about to purchase machinery for the Arlington mine. Address Thomas Donan, Ruby Camp, Washington.

Malt, Larue County, Kentucky—Arrangements are being made to open a deposit of manganese ore lately discovered. Drills and other machinery will be needed. Vantyne Pritchard, Malt, is owner.

Myers Creek Mining District, Washington—The Saranac Mining Company, J. W. McCune, Spokane, Wash., secretary, has given a contract to the Russell-Fairbanks-Morse Company, for a sawmill of 5000-ft. a day capacity to be installed within 30 days. This company will install a 40-h.p. hoist and three-drill compressor within three months. Mine near Chesaw postoffice, Wash.

The Mad River Mining Company will install a three-drill compressor and hoist.

Special Correspondence.

San Francisco. May 23.

Large numbers of mining men have come to San Francisco since the earthquake and fire and are still here. They came from all points on the coast and from Mexico, not only to look after families, friends and property, but to see what is to be done in a business way. San Francisco, as a center of finance on the Pacific Coast, furnishes the capital for numbers of mines which are in process of development, and in numbers of instances work has had to be suspended on the properties until those who have been backing the enterprises are again in a position to furnish the necessary money. This not only caused the temporary cessation of work in many cases, but in numerous others operations have had to be permanently stopped. Thousands of the wealthy citizens of San Francisco have had their incomes cut off entirely, and others have had theirs so reduced as to be unable to finance anything at all, all their resources being utilized in re-establishing themselves in business and building new quarters. This condition makes it impossible to proceed with work on numerous properties in this and adjoining States.

Of course, when mines were self-supporting, they were all right; but where only in process of development, miners have had to be discharged and work entirely suspended, for the present, at least. Many superintendents and other officials have been thrown out of employment, as well as the working miners. People who have been working these mines under bond have thrown up the bond and let the claims revert to the original owners. Certain properties too, have been put to temporary inconvenience in not being able to get machinery and supplies at the time needed, so many foundries, machine and supply shops having been destroyed by the fire.

Aside from these features, however, the mines of this State have not been in any way affected by the earthquake, and great conflagration. The mines, quarries, etc., of California, continue steadily to produce without interruption by convulsions of nature or fury of the elements. Of the total mineral product of $45,000,000 fully $20,000,000 is from the gold mines alone. This is an asset of the State which, strange as it may appear, has not been considered or mentioned by the various committees working toward the rebuilding of the destroyed city. Yet this city was originally built from the proceeds of the mines, was founded by them and fostered by them more than from any other source. The talk is all, however, on the building up of the business houses and firms, the re-establishment of manufacturers and industries, the construction of "sky-scrapers," of hotels, theaters, restaurants, etc., the enlargement of trade and commerce—

or its retention at least—with no word whatever of the industry which has been and is the largest factor in the foundation and maintenance of all these things. Since the days of the lamented Ralston of the Bank of California, no bank in San Francisco has assisted mining operations pure and simple. No miner can obtain money from them, to open and develop his property, no matter how good the prospects or sure the result. They have confined themselves mainly to operations in San Francisco with little or no attention to the interior of the State.

Possibly this lesson to the banks in San Francisco may eventually result in benefit to the mining industry of the State. In the midst of the greatest catastrophe in the world's hisory, where hundreds of millions of dollars' worth of property are swept away in a brief time, the mines, which were all outside of the stricken district, though largely owned in it, continue to produce as before, and there was no loss among them whatever. The bank managers may perhaps look outside of San Francisco a little and interest themselves in an industry which is so productive and safe. There are gold mines, like the Keystone in Amador county, which have been productive for over half a century; and there are others, like the Kennedy, Empire, North Star, Gwin, Utica, Zeila, Argonaut, South Eureka, Standard Consolidated, Angels, Rawhide, Yellow Aster, Mountain Copper, Hidden Treasure and many others which might be named, that have been paying since they were opened or reopened. And there are hundreds of others which could do as well did they have the capital for development and equipment. But not a cent can any of the mines, good or bad, get from the San Francisco banks.

The machinery dealers and iron manufacturers of San Francisco, after preparing a preliminary organization, are considering the advisability of concentrating the iron industries in one place in the city, after the fashion of the banks, insurance companies, wholesalers and retailers. This would facilitate business on their part; and as most of the streets are bare of buildings, sites may be obtained in large tracts by purchase or lease. In fact, the owners of land will be glad to lease to men who will build and remain indefinitely. The only trouble seems to be the proposed restrictions in the character of buildings in the new city. Foundry and iron men do not want to put up Class A buildings or sky-scrapers. They need low buildings covering large areas; and the restrictions applicable to structures in the settled districts should not apply to them.

The commencement of building the new smelter plant at Point San Bruno on the bay shore by the Guggenheims will not be made at once, as expected. It was intended that a large tract of tide-land should be filled in to make necessary room, but it is now found that the established harbor lines will prevent this being done. As a result the ground plans must be revised and the plant set further back from the bay shore than had been expected. This will cause a material delay and it will doubtless be some months before any active steps will be taken. There will have to be much more grading done before the buildings can be started than was the original intention.

When the shot-tower building in San Francisco, owned by the Selby Smelting and Lead Company, was destroyed by fire there was stored therein about a quarter of a million dollars' worth of metal, mainly lead, copper and zinc. This has all melted into a mass of alloy in the bottom of the ruins. It is going to be a big job to get this mass out and separate the metals.

The general manager of the Associated Oil Companies and the vice-presidents of the California Refineries, Ltd., and the Union Oil Company have gone to Japan to see about selling large quantities of California fuel oil. Japanese naval authorities and the owners of the several steamship lines, including the Toyo Kisen Kaisha, whose steamers sail in and out of this port, have invited them to present bids for supplying millions of barrels of oil as a fuel substitute for the coal they now use. There will be keen rivalry in submitting bids for their companies and their success will be watched with interest in shipping and naval circles, as well as in oil and financial circles. Aside from the Standard and its local adjunct, the Pacific Coast Oil Company, the three concerns mentioned are the largest producers and sellers of California oil. It is known that they expect to bid for contracts calling for 2,000,000 bbl. a year for a period of 10 years, or a total of 20,000,000 bbl. Once a contract of this kind is signed, it will constitute the first big foreign outlet for the California fuel oil and mean the entering wedge for a remarkable market for oil in the Orient.

Loomis, Wash. May 24.

A good deal of work is being done in the Myers Creek district in Okanogan county. The Saranac Mining Company is making preparation for extensive operations. At present only four men are employed, but the force will be largely increased. It is expected there will be a large tonnage of ore ready for shipment by the time the Vancouver, Victoria & Eastern Railway will be ready to receive it for transportation to the smelters.

The Mad River Mining Company, owning a group adjoining the Saranac, has ore ready to ship and will install new machinery. A body of zinc-blende, carrying gold and silver, has recently been opened at a depth of 400 ft. nearly.

At the Olentanzy, the vein is opened by a shaft now down 80 ft., and a tunnel in over 50 ft., with ore assaying well in gold and silver, the former predominating. Light hoisting machinery will be installed.

At the Bimetallic, a new shaft will be sunk. The company will venture $10,000 for development, and add more, if the prospects will justify it.

It is reported that the Ben Harrison Company has paid up its indebtedness and will start up its mill June 15; that there is enough ore on the dump to keep it running steadily. The principal work in hand is driving 500 ft. of tunnel.

At Grant, the British Columbia Copper Company, of Greenwood, B. C., has 11 claims bonded for $82,500. It is believed the bond will be taken up shortly, and work be resumed.

At the Crystal Butte, work will be resumed as soon as railway transportation for the ore is available. There are about 2000 ft. of tunnel and shaft workings on this property, that cost in the neighborhood of $100,000.

The Butcher Boy Group has a shaft down 80 ft. on ore from 5 to 20 in. wide, which assays well, principally in gold. There is enough ore mined to pay six months expenses. It is expected that the bond will be taken up immediately, and the ore will be shipped; also that machinery will be installed as soon as the 100-ft. level is reached.

Butte. May 27.

La France Copper has begun unwatering the old workings on the Lexington property. It is using two tanks of 1000 gal. each and an electric pump having a capacity of 380 gal. a minute. The shaft is 1465 ft. deep and the water is up to the 550. In addition to the shaft, there are miles of drifts and crosscuts to be drained. One crosscut extends from the 600-ft. station to the Alice mine, half a mile north, and the latter must be drained to that level. It is estimated that at least six months, and possibly eight, will be consumed in the work of emptying the openings. La France is mining ore on the 200-, 300-, 400-, and 500-ft. levels and will work downward as the water lowers. Its present output is not more than 100 tons a day. One compartment of the shaft has been reserved for ore production. A separate engine will do the work.

The Original Company expects to begin operating one of its converters soon and to place the other in commission a little later. Only blister copper has been turned out of this plant heretofore. The company is still shipping between 200 and 300 tons of ore a day to the Washoe. During April and so far this month the company has not made much copper, but expects to be running full blast early in June.

Reins Copper is crosscutting for its north and south veins on the 1200 and expects to strike the former in a few days. This vein was only 40 ft. from the shaft at the 800-ft. level and seemed to have an almost perpendicular course. Two pumps have been installed on the lower station.

Raven Copper is preparing to double its output of 100 tons a day. It has broken down about 1000 tons of first-class ore in the east drift of the Snoozer vein on the 1200 preparatory to putting in chutes in order that the ore can be handled more economically. On the 1500 it has doubled the width of the tramway from the station to the 20-ft. vein of 4 per cent. ore and is preparing to stope. It is also drifting to catch the shoot opened on the 1200 and is now in the narrow end of it. This shoot is about 300 ft. long and has an average width of 6 ft. Manager Berkin says he can extract 300 tons a day as soon as the preliminary work is finished. The merits of this property have not been overrated.

Butte & Boston is preparing to mine the ore of the Snohomish and Tramway mines through the Berkley shaft. An ore bin is building at the Berkley. These mines were formerly operated by a receiver appointed by the United States court on account of litigation between F. A. Heinze and Amalgamated and were good producers. Coalition owns half of the Snohomish and a third of the Tramway.

North Butte is making rapid progress in the adjustment of its new surface equipment. The engine is fast assuming shape and the head frame is nearly complete, one of the top girders having been spliced today. Its output is between 800 and 900 tons a day, but it intends to increase it to 1500 when the new engine is in running order.

Salt Lake City. May 26.

The Silver King Mining Company, operating at Park City, has concluded the purchase of additional property, consisting of the Woodside Mining Company, and all the holdings of the Ferry estate on Treasure hill. The deal, so far as the Woodside Company is concerned, will be ratified on May 28. The Woodside was, in the early days of Park City, considered to be an important mine, and it has a record of production.

Last winter coal users in Salt Lake City and other places suffered a shortage of fuel, and at one time the situation took on a serious aspect, mine operators being unable to supply the demand. To prevent a recurrence of these conditions dealers are preparing to store many thousand tons. Mine owners are also taking steps to increase their outputs. The Utah Fuel Company, which makes practically all the coke used by the smelting concerns in the Salt Lake valley, is adding 250 ovens to its present capacity, increasing it about 30 per cent.

Samuel Newhouse recently secured an option on the Big Indian copper mine in the La Sal mining district. The property has been examined by Auguste Mathez.

The management of the Ohio Copper Company, operating at Bingham, has concluded to sink a new triple-compartment shaft, and equipment will be provided accordingly. The shaft is to be dropped to the 1000-ft. point without delay, to develop the ore deposits.

The filing of the answer of the Silver King Mining Company in the trespass and damage suit brought by the Magnolia-St. Louis Company, followed by the introduction of the injunction suit by the latter continues to absorb public interest.

The Wasatch Copper Company, with $600,000 capital stock, has been organized at Ogden. D. S. Tracy is president, and Leo Harris secretary.

Development, as well as production, at the Starless mine, in Bingham, is to be pushed upon an extensive scale. An order was placed with the Utah Mining Machinery & Supply Company this week for Ingersoll-Sergeant drills and compressor. The ores of the mines are to be treated at the Wall mill, which, like the Starless mine, is owned by Col. E. A. Wall, of Salt Lake.

After considering the proposition of raising funds for further development and equipment of its mine in the Tintic district, the board of directors of the lower Mammoth Mining Company has levied an assessment of $7,500 or 10c. a share.

Manager Lafayette Hanchett, of the Boston Consolidated Mining Company, has placed an order for a stamp mill of the Nissen variety for use in the company's new mill, now in course of construction, at Garfield. The company is shipping regularly from 200 to 500 tons of ore daily.

Denver. May 26.

At a special meeting of the members of the American Mining Congress, held in this city May 24, the question of fees for membership and initiation was discussed at length and by an almost unanimous vote the former was raised from $2 to $10 and the latter from $5 to $15, in order to provide for the maintenance of the proposed mining temple, for the building of which some large donations have been promised and the construction of which will, it is hoped, commence before long.

The report that the American Smelting and Refining Company has acquired the control of the so-called mill trust also, thus securing complete control of the metallurgical plants of this State, has been received here and the deal whereby that company virtually eliminates all opposition in the field of ore treatment seems to have gone through.

James Kirwin, acting secretary of the Western Federation of Miners, is making arrangements for the annual convention in this city commencing May 28. President Charles H. Moyer and Secretary William D. Haywood are still in jail at Boise City, Idaho. At the opening of the May term of the District Court at Caldwell, next week, their attorneys expect to file applications for a change of venue, claiming that it will be impossible for them to secure an impartial trial there. It is generally supposed that if the charge of venue is denied, cases of minor importance will be disposed of first, so that it would in that case be June 10 or later, before their trial will begin. Beside the troops stationed at Boise City there will be United States cavalry sent to Caldwell while two companies of State militia have been notified to prepare for field duty.

The Mine Owners' Association has retained Congressman H. M. Hogg for the prosecution of Vincent St. John, president of the Burke, Idaho, Miners' Union, under indictment for murder at Telluride.

The success of the cement works, 8 miles east of Florence, at Portland, has induced a new company to enter the field and the United States Portland Cement Company, owning 360 acres of shale land a mile east from Portland, will erect a 500-barrel mill to start with. The plant will be built for a capacity of 2000 barrels. The company is incorporated with a capital of $800,000.

One of the most important transactions made in this State for some time was the sale of the new Contention mill, near Silverton, to the Arpad Mining and Milling Company. The price is stated to be $60,000. The original cost was much greater, but development showed that the ores of the North Star mine, for the treatment of which it was built, were smelting ores, which the mill could not treat advantageously.

From indications it looks as if a new industry will be added to those in this State by the development of large gypsum deposits, situated about five miles north of Florence, by the American Gypsum Company, of Kansas.

The funeral of Edward G. Stoiber, who was for the past 25 years identified with the mineral development of southern Colorado, and who died in Paris, France, a few weeks ago, was held here this week in the presence of a large number of friends and the remains buried in Fairmount cemetery.

Duluth, Minn. May 27.

Iron-ore shipments have been very heavy this week, and the shipping interests have about recovered from the congestion caused by the recent strike. Ore has been going forward from the docks of the Duluth, Missabe & Northern at the rate of from 60,000 to 80,000 tons a day; the Duluth & Iron Range and the Great Northern have both made record shipments. The month, though hindered by the strike, will show a total nearly as large as any May on record, while it is expected that June will beat all prior similar periods.

The new Monroe mine of the Oliver Iron Mining Company, on the western Mesabi, will ship 1,000,000 tons this year from its B and C shafts. These are now both milling ore. At A shaft no milling

will be done this year, as the property is not stripped sufficiently; but the stripping contractors are working three shovels there, with a large force of men. With the two shafts in order and a demand for ore this mine will be able, though hoisting its product from underground, to make a tonnage of 2,000,000 tons per annum. B and C will be working full in the course of a few weeks.

Mayas mine, in 15-59-14, is now shipping a large tonnage daily, the railway having been completed to the mine. It is expected that shipments this year will amount to 100,000 tons. Not a pound of steam is required, nor is there any pumping, for the ore lies under a light capping on a side hill that enables the tracks to come in below it, so that mining is at about as low cost as at any point on the range.

It looks as though the Shagawa Iron Company had found a good mine on Section 30-63-11, Vermillion range, where it has been at work since last October. The shaft is now down 290 ft. and is again in ore of high grade. This shaft cut a body of ore from the 115-ft. level to 160, then ran into Jasper and again caught ore at 248 ft. At 290 it is still in this ore, which assays up to 67 and 68 per cent. and is very low in phosphorus. There are 350 ft. of crosscuts on the 160-ft. level in ore and on the 265-ft. a crosscut 45 ft. north is still in the same ore that was cut at the shaft at 248 ft. Three shifts are employed and the work is progressing rapidly.

The Rhodes Iron Company, which is operating the LaRue, Croxton, Brunt and Hobart for the Cherry Valley Iron Company is to open mine headquarters at Hibbing, on the Mesabi range, and will erect an office building there. In the current daily publications this company and the Winnifred Mining Company have become mixed up, but they are separate and different concerns, with no interest in common.

The Winnifred Mining Company is taking up a number of options on the Menominee range, and will explore there. It had two or three small options there a few weeks ago, but has now added materially to the list.

The Cleveland Cliffs Iron Company, which owns some small ore deposits in T 46-23, Mesabi range, will, it is reported, open one of them this year. This company is getting its Crosby mine, near Nashwauk, into shape for mining a considerable tonnage this year.

H. V. Winchell, who became head of a geological department for the Great Northern road recently, will have much to do with the development of the road's ore lands on the western Mesabi. These lands have never been completely explored, and it is not known what they contain. For some miles occasional holes sunk at long intervals, have cut ore deposits and the supposition is that the ore exists in large quantities; but aside from a comparatively few bodies they have never been fully shown up. Mr. Winchell will develop these lands. From this it may be understood that the much talked of sale of Great Northern lands to the United States Steel Corporation has not been closed, and that there is at present no liability of any such deal. Mr. Winchell will maintain an office at St. Paul, but will spend much of his time in and around Duluth. He is familiar with the Mesabi range, and with northern Minnesota ore districts in general.

Platteville, Wis. May 26.

The concentrating plant at North Buena Vista, across the river from Cassville, Iowa, is about completed; and it is expected that, should the output of the mine upon which it is located be such as to put the property on a paying basis, there will be considerable prospecting done in the immediate neighborhood, as the locality at one time produced considerable quantities of lead.

The Fox Lead and Zinc Company let a contract during the week for a five-drill compressor outfit, two direct-connected 10-in. crosshead lift pumps, hoist and 80-h.p. boiler. The Fox people have been drilling on 240 acres for the last nine months and have only had four blank holes.

The known mineral-bearing ranges are continually extending their limits to the east. The strike reported in the JOURNAL some weeks ago as having been made near Darlington is proving to be as good as at first predicted. At Blanchardville, east of Darlington, a drilling company reports good ore at a depth of 130 feet.

The new compressor plant at the Murphy mine at Hazel Green has started up. This is one of the many properties that has been thoroughly prospected before putting on top machinery of any consequence. There have been recently installed an additional 100-h.p. boiler, larger pumps, compressor and hoists.

The old Waters mine, Galena camp, has been worked in a primitive manner all winter. The owner has piled up the mine run and intends to clean up during the summer. This mine is located in the city of Galena and a few years ago was equipped with a large modern mill, but owing to some misunderstanding between the owner and promoter this mill was moved off.

The property known as the King Solomon has been recently taken over by Chicago parties, who expect to install the necessary equipment to develop the ground.

Scranton. May 28.

Chief Roderick, of the State Bureau of Mines, has issued his report for the year 1905, which shows that there was a large increase in the production of anthracite, making it the banner year in the history of the industry. The increase was more than 5,000,000 tons. The production for the past five years was as follows: 1905, 78,647,020; 1904, 73,594,369; 1903, 75,232,585; 1902, 41,340,935; 1901, 67,094,665; 1900, 57,363,396 tons.

Notwithstanding that the production showed an increase, the number of days worked were less than in the two years previous. In 1905 the working days were 208; in 1904 they were 218, and in 1903 they were 211. The number of employees show a substantial increase, being as follows for the past six years; 1905, 168,254; 1904, 161,330; 1903, 151,827; 1902, 148,141.

The number of fatal accidents also shows an increase, being as follows: 1905, 644; 1904, 595; 1903, 518; 1902, 300; 1901, 513; 1900, 411. During the year there were 1,289 non-fatal accidents, while 1,902,820 kegs of powder and 8,353,594 lb. of dynamite were used.

A drainage tunnel about two miles long is practically completed by the Pennsylvania Coal Company, for the purpose of draining its mines in Dunmore, and to replace the various pumping stations which have been a source of great expense to the company for many years. More than 600,000 cu.ft. of rock and coal have been removed at a cost of about $100,000. Beginning at the foot of No. 1 shaft the tunnel extends on a gradual slope to the Lackawanna river in North Scranton. The opening of the tunnel in the mine at the highest point is 272 ft. from the surface and for the entire distance the tunnel is 15 ft. in hight and 7 ft. in width. A section was also built which will be used for hauling coal from the veins branching out of the tunnel to No. 1 colliery, where it will be prepared for market. The building of the tunnel will obviate the necessity for building a costly breaker, as was projected at one time, as all points of the company's property will now be reached by means of the tunnel. The power for hauling in the tunnel will be derived from a $100,000 electric plant to be built at the colliery.

William Watkins, of Edwardsville, has been granted a Carnegie silver medal and a present of $1200 for saving the lives of three miners in the Kingston mine, in September, 1904, following an explosion.

Morgan Morgans, of Carbon county, who has been acting as mine inspector, without the authority of the State department, will resign an office which, it is claimed by the department, he never held. Morgans, who passed the examination before the Lackawanna board, was elected, while Isaac Davies, who passed the examination before the Luzerne county board, was the second at the polls. While the controversy was unsettled the chief inspector appointed D. J. Roderick to have supervision of the district. Davies will be appointed as soon as Morgans' resignation is received.

The coroner's inquest into the cause of the disaster in the Shenandoah City col-

liery, when seven men lost their lives, has attracted great attention. The State inspector has employed counsel. Two witnesses have sworn that it was caused by a gas explosion, while 12 others declared that it was due to a dynamite explosion.

John Lloyd, of Philadelphia, has purchased some valuable coal lands from the Richardson estate, near Pottsville, including 700 acres adjoining the Buck Mountain Coal Company's lands.

The story sent out from Philadelphia that John Mitchell will soon resign the leadership of the United Mine Workers, is denied by friends who have been in communication with him during the past week.

The State law demands that no person shall be employed in a mine, unless he is able to speak English. Last week a Hungarian, who had been in the country but one week was killed in a mine in Rappahannock.

Work on the new Coal Castle shaft of the Reading Company, in the Heckscherville valley, is proceeding briskly, and there is some talk of using the shaft to pump out the water in the entire valley and to open a new colliery in connection with the old workings in Heckscherville and Glen Carbon. There is some coal, abandoned for the present, in the valley, owing to the presence of a great body of water.

A fire of mysterious origin threatens the Centralia colliery, Pottsville. It is believed that some mischievous boys ignited a coal outcrop, which was not discovered for some hours afterward. Desperate efforts are being made to prevent the fire reaching the interior of the workings.

Toronto, Ont. May 26.

The township of Coleman, in which the Cobalt mining camp is situated, has been constituted a special mining division under the new mining act, which is now in force. The principal effect of this change is that the maximum size of mining claims to be hereafter granted will be limited to 20 acres.

The regulations respecting corundum mining adopted in 1898, providing special conditions with a view to the establishment of the industry, have been abrogated, and corundum mines placed under the general provisions of the new act.

Major Gordon, who has been operating with a diamond drill on Clear Lake at a point where the water is over 50 ft. in depth, has struck a vein. A casing-pipe was sunk to the bottom and a chopping bit put in operation, going through 8 ft. of mud and boulders before striking bedrock. After drilling in the rock, a core was brought to the surface which assayed high in silver, and contained a nugget of native silver. The locality of the strike is nearly midway between the eastern and western ends of the lake. On the adjoining mainland to the south a shaft has been sunk 25 ft. on a vein of graphitic schist carrying iron pyrites, the last 5 ft. of which runs through calcite assaying high in silver. Clear Lake lies about a mile west of the town of Cobalt.

The first of a series of actions brought by Attorney-General Foy of the Ontario Government to set aside mining leases of claims in the Cobalt area, claimed to have been wrongfully obtained by means of fraudulent affidavits of discovery, has been progressing for several days before Justice Boyd in the High Court at Toronto. The defendants in the case are Edward C. Hargreaves, of Bay City, Mich., Frank Rutherford, of Niagara Falls, Charles G. Williams, of Montreal, and the White Silver Mining Company, of Toronto. This suit involves the validity of leases covering 200 acres of mining lands. The defendants claim that the discoveries were properly made by George Haines, a student of the School of Practical Science, Toronto, in November, 1904. The time occupied in prospecting was placed at four days, and as the ground was covered with snow at the time, the government contention is that the work could not have been done. Professor George A. Mickle, of the School of Practical Science, who knows the territory in dispute, swore that he regarded the prospecting of the lands in four days as practically impossible. The suit is still in progress and a large number of witnesses remain to be heard. This case and others involving the title to large areas in Coleman township,now held under "blanket" claims, excites great interest among mining men. Should the leases be set aside by the court, the lands will be thrown open again to prospectors.

Victoria, B. C. May 24.

Cariboo—A brief report of last season's deep-drifting operations of the Slough Creek Gravel Gold, Ltd., an English company owning a big hydraulic mine situated on Slough creek, Cariboo, has lately been made public. The manager of the property, in response to the district gold commissioner's request for information for publication in the Annual Report of the Minister of Mines for 1905, wrote as follows: "During the year a total of 510 ft. of drifting was done in schist bedrock, chiefly on the down-stream side of the main tunnel, and the gravel was tapped in five fresh places. Several boreholes were also put up from the drifts to the gravel. In the beginning of the year the flow of water from the workings was at the rate of 572,000 gal. per day, and was gradually increased by fresh openings to more than 1,000,000 gal. per day by the beginning of June. During the last four months the average daily flow has been at the rate of 1,115,000 gal., and this has kept the two duplex steam pumps going constantly at a moderate speed. There is still a free flow of water from the ends under a high pressure, which has prevented any attempt at extraction of the gravel, beyond small sample lots, and the drainage of the gravel will take considerable time. The samples taken showed a good gold prospect at all points and confirmed those previously taken. An average of 25 men was employed throughout the year, and 13 men in the bush cutting and hauling fuel and mine timber. The mine buildings were extended, but there were no additions to plant and machinery, all of which kept running in good order." Slough creek lies between Williams and Lightening creeks, which together produced a large part of the gold taken years ago from the extremely rich placer ground of the district. The Slough Creek Gravel Gold, Ltd., owns about 13 miles of old channel or deep lead, all of which is the old channel of Williams creek. The deep gravels on Slough creek were not worked in the early Cariboo days owing to the difficulty of dealing with the strong flow of water met with in the deep old channels. The former Slough Creek Company, after a considerable expenditure of money, succeeded in sinking a three-compartment shaft, mostly in bed-rock, to a depth of about 362 ft. From the bottom of this shaft it drove an 8x7-ft. tunnel, also in bedrock, a distance of about 1100 ft. Near the end of the tunnel branch drifts were run, these reaching the gravel at several points and tapping a large volume of water, which has been running off for between two and three years. Pumping is done by two Worthington pumps, each having a capacity of 500 gal. per min. Steam for pumps, air compressor, ventilating fan, hoist, electric lighting plant, etc., is generated in four boilers, 120-h.p. in all.

Atlin—Official returns published last week show the gold recovered during 1905 in the Atlin district, Cassiar, Northern British Columbia, to have been 22,832 oz. valued at $358,478. Of this quantity individual miners recovered 9493 oz. and companies 13,339 oz. The total of the royalty on this gold collected on behalf of the Provincial Government was $5177. The several creeks from which the gold was obtained and the respective quantities were as follows: Pine creek, 5894 oz.; Birch creek, 199 oz.; Boulder creek, 8575 oz.; Wright creek, 250 oz.; Spruce creek, 6191 oz.; McKee creek, 1723 oz. More than half the gold recovered by individual miners came from Spruce creek, which yielded them 5943 oz.; with Boulder creek next, 1742., and then Pine creek, 1210 oz. Of the recoveries made by companies, the Société Minière de la Colombie Britannique, of Paris, France, made returns for royalty purposes of a recovery of about 6450 oz. valued at $103,000. The Pine Creek Power Company and the North Columbia Gold Mining Company, jointly, under the management of J. M. Ruffner, made an output aggregating more than $50,000 in value, while the Atlin Willow Creek Gold Mining Company recovered about $14,000. The gold commis-

sioner at Atlin reported that the British American Dredging Company met with but indifferent success on Gold Run creek last season for "notwithstanding the use of the Keystone drill and dynamite, which certainly assisted very much, the cemented material with which the dredge had to cope proved too hard for that style and weight of boat and machinery, and did not meet the expectations of the management in the amount of material moved, although very fair returns were realized from this material." The same company's dredge on Blue cañon appeared to work "smoothly and efficiently." Regarding the "initial venture with a steam shovel" in Atlin district, viz., that of the Northern Mines, Ltd., the commissioner said: "Notwithstanding the embarrassments and losses that almost invariably attend initial and experimental ventures, this steam-shovel worked very satisfactorily and convinced the management that, with some additional equipment and changes in methods of operation, this style of plant can be made to pay handsome profits."

Mexico. May 12.

In response to the call issued about a month ago by Attorney José Luis Requeña, president of the Dos Estrellas mine of El Oro, who was appointed secretary at the meeting of mining men held last year for the discussion of the new monetary laws, there met in the City of Mexico, on Tuesday, May 15, in the offices of Attorney Pablo Martinez del Rio, some 90 or 100 of the representative mining men of the Republic, both native and foreign, to organize and establish a mining center in the Republic, for the purpose of promoting and protecting the interests of the mining industry in Mexico; to act as the representative of mining concerns before the Federal and State Governments, and before mining men and societies in Mexico and abroad. It is known as the Junta Central de Mineros, or Chamber of Mines of Mexico. After an enthusiastic gathering the Chamber of Mines was permanently established by the adoption of articles of incorporation and by-laws, and the election of the following officers: Lic. Pablo Martinez del Rio, president; Lic. José Luis Requeña, first vice-president; Ing. Carlos F. de Landero, second vice-president; Ing. Ignacio Ibarguengoitia, third vice-president. Directors—Lic. Carlos Robles, Ing. Edmundo Girault, José Castellot, Ing. George W. Bryant, Lic. Rodolfo Reyes, Ing. D. R. M. Raymond, Ing. Morril B. Spaulding, Ing. Gabriel Manecar, C. V. Van Law, Guiellermo Brockman, Ing. José J. Reynoso, Oscar Braniff, J. S. Pattinson, Pedro Cordoba, Ernesto DuBois, Fernando Sustersic, Ramon Alcazar, Lic. Luis Elguero, Vicente Iriza, W. C. Potter, W. A. Pritchard, Vicente Ferrara, Lic. Miguel Lara, Lic. Agustin Lazo. Twelve of these men (to be decided later), shall serve for one year, and twelve for two years, so that henceforth twelve directors may be chosen each year. The directors elect their own president and vice-presidents, and in the boards are vested full power to act for the organization.

After the election of officers a committee was appointed, consisting of Pablo Martinez del Rio, José Luis Requeña, Carlos Robles, Ramon Alcazar, C. W. Van Law, W. S. Pattison, W. A. Pritchard, Ignacio Ibarguengoitia, Rodolfo Reyes, Augustin Lazo and Ernesto Du Bois, to wait on the president and advise him of the action taken. This was done at an audience given the delegation in the National Palace at noon of Thursday, May 17, when Sr. del Rio, in the name of the chamber, addressed President Porfirio Diaz in substance as follows: "About a year ago prominent mining men of Guanajuato conceived the idea of calling representatives of the most important mining companies in the Republic to the capitol to review the mining situation, and the relation of the new monetary reform to it, and discuss with the Government the effects of the new law on the mineral industry. Such a convention was held, met your honorable self, presented its fears and wishes, which were cordially received and justly treated. At this same convention the idea of a permanent chamber of mines originated, and thanks to the efforts of José Luis Requeña has resulted in the meeting on May 15 of the representatives of the principal mining and metallurgical companies of the Republic. A chamber of mines was organized, an executive committee chosen and given the management and power of direction, and we have the honor to appear here before you that you may be given the first official notice of such organization, its policy and purposes, and to place the same under your just and powerful protection. Therefore are we here and beg to inform you that the sole purpose is to promote the growth and development of the mining industry in Mexico, and we trust that we may have your valued assistance.

After a cordial response by President Diaz, in which he congratulated them and expressed his pleasure that such an organization had been effected, regretting only that it had been so long delayed, the committee proceeded to inform officially the other departments of the Government.

The chamber will meet every six months, and in the meantime the articles of incorporation and the by-laws are being prepared for publication by the secretary, Geo. T. Hilbert, with offices at Espalda de la Santa Vera Cruz No. 2, in the city of Mexico.

London. May 19.

As mentioned last week, tin occupies the chief position in the minds of mining men here. The metal went as high as £215 per ton, but already there has been a set-back, owing to the entry of bears, who had a strong belief that the rise in the metal was not solely due to the laws of supply and demand. There are signs also that the price has become prohibitive to some buyers, for many of the tin-plate factories in South Wales are having to go on short time owing to their inability to advance their prices any further. In the meantime promoters are casting about for properties to float, and more responsible people are contemplating opening up known properties that have not looked like paying propositions at other times.

An example of the reopening of an old Cornish mine is to be found in the case of Wheal Vor which is about 10 miles south of the Dolcoath, and in the same hands. This, in days gone by, was one of the great mines, and the main lodes were exceptionally rich. Since 1875 it has not been worked, and it is now under water. It was known that there were many side lodes and another parallel lode that were worthy of exploration and development, but they were lean ores compared to those in the lode that was exhausted. The exploitation of lean ores had not arrived at the stage of practical policy in those days, and the value of black tin was not more than £40, a price which was not encouraging. The time is now opportune for unwatering and reopening, and the London and Cornish people who supplied new capital to Dolcoath 10 years ago, are now coming forward with money for Wheal Vor. Among the subscribers to the new capital are to be found many eminent Cornish names such as Thomas, Harvey, Holman and Pearce. It is interesting to note the presence of the name of Richard Pearce, of Denver, among them.

Another new mining property, producing tin, though only as a subsidiary product, that has recently been introduced in London is the Conrad Stannite mines, situated at Mayo, New South Wales, not far from Inverell. These mines have well defined lodes containing argentiferous galena, copper and iron pyrite, sulphide of tin, and a little blende. The ores are quite easy to treat. Some of the galena and sulphide of tin is separated by hand, and a large part of the remaining galena is recovered by water concentration on Frue vanners and Wilfley tables. There is no need to worry about removing the blende, as the quantity is small. The pyrites (iron, copper and tin) concentrates were at first smelted in a reverberatory, and latterly in a blast furnace, in which a copper matte was obtained and the tin thrown into the slag, the latter being subsequently retreated in a tin-smelting furnace. Some proportion of the unseparated lead goes into the copper matte and the tin slags. It is the intention in future to separate the tin pyrites from the copper pyrites by the Wetherill concentrator, and to treat the two products independently. The argentiferous galena is sold to smelters, as also is the copper matte.

General Mining News.

Tennessee—This company's statement of production for 1905 is as follows:

	Tons.
Red ore mined	1,282,129
Brown ore mined	154,093
Total iron ore	1,436,232
Coal converted into coke	1,286,922
Coal used or sold	944,737
Total coal	2,231 659
Coke made	890,634
Limestone and dolomite	212 290
Pig iron made	529,086
Open-hearth steel ingots	246,55

The finished product from the Ensley steel works included 34,961 tons blooms and billets and 163,853 tons rails; a total of 198,814 tons. The finished material from the rolling mills at Bessemer was 15,129 tons bars and 10,037 tons plates; 25,166 tons in all.

ALABAMA.

JEFFERSON COUNTY.

The prospecting which has recently been done by H. F. DeBardeleben, the pioneer coal developer of Alabama, in the southern part of Jefferson county, a few miles from Bessemer, has been successful, and arrangements are now being made for the construction of a railroad line to the place.

ARIZONA.

MOHAVE COUNTY.

Chloride Gold Mining Company—This company's Samoa and Fourth of March mines are producing regularly ore of good value, which is being shipped to the Needles smelter. The ore is an iron and lead sulphide, carrying gold and silver values. The property is equipped with hoisting plant, two air compressors and rock drills. Development consists of one double-compartment shaft 300 ft. deep, and 4000 ft. of tunnels and drifts. About $200,000 worth of ore is now blocked out and more is being added as development progresses. There are 25 men employed at the mines. L. Hoffman is superintendent and manager.

CALIFORNIA.

AMADOR COUNTY.

Del Monte Mining Company—The directors have voted to increase the capital stock from $100,000 to $300,000 and at a special meeting to be held July 9 the stockholders will decide on the proposition.

Kennedy Mining and Milling Company—The placing of the new compressor for this property at Jackson is delayed for want of cement for the foundation, this being a very scarce article at present, notwithstanding the large production of California.

Mitchell—The lien-holders are operating this mine, having obtained judgment for their respective claims. Some 700 tons of ore which were on the dump are being milled.

BUTTE COUNTY.

Overlooked—This mine in the West Branch, near Magalia, it to be extensively developed this summer. Among other improvements a large concrete dam is to be built across the river.

CALAVERAS COUNTY.

San Andreas Blue Gravel—This property has been bonded to Geo. W. Kimball, of Placerville, together with the Rhoy and Salcedo places adjoining, which will give 3900 ft. of channel to work. The main shaft will be sunk to the channel bed and drifts run both ways along the channel; crosscuts will also be run. Work will commence at once.

EL DORADO COUNTY.

Roundout—This mine, Blair's district, has been bonded by Fairchild and Richards to Bingham and King, who will push the work of opening the property.

Cedar Creek— At this mine Superintendent F. M. Phelps has the new air compressor in operation and the tunnel is in one-third of the distance necessary to reach the channel.

INYO COUNTY.

Piute Cañon—From this district good ore is being taken out of the Neylon group, some of it a specimen character. The same may be said of the Leidy mine. There are large bodies of fair-grade ore in both these claims.

Argus Range Mining Company—This company has been organized in San Diego by Chas. W. and M. C. Robinson, of San Diego, and H. M. Barstow, E. M. Wardwell and L. D. Rich, of Los Angeles. The company will work some 14 claims located in Death Valley, the principal one of which is the Rosetta on which some work has been done, and from which some ore has been extracted.

Furnace Creek Copper Company—This company was incorporated in the State of Washington on May 15, 1905, with $1,250,000 authorized capital stock, in shares of $1 each, all full paid ($93,000 thereof being now in the treasury). The property is located in the Furnace Creek mining district, about 125 miles north of Ludlow, and consists of 22 claims (400 acres) and two fractions. The Tonopah & Tidewater Railroad, which is building from Ludlow, Col., to Bullfrog, Nev., has offered to build a 12-mile line to the Furnace Creek properties and the Las Vegas & Tonopah Railroad, an ally of the San Pedro, Los Angeles & Salt Lake Railway, has also offered to build a 30-mile line, reaching the mines, both upon request.

The ore carries copper, with light values of gold and silver. The erection of a 300-ton smelter is in contemplation. Trustees, P. Clark, Philip Greason, Denis Clark, Fred Burney and W. J. C. Wakefield.

SAN BERNARDINO COUNTY.

J. H. Hoff, acting for the Chloride Gold Mining Company, of Chloride, Arizona, has acquired the Iron Gossan group of claims, which consists of 11 full claims and one mill site—225 acres in all—situated in the northeast part of San Bernardino county, about 70 miles south of Bullfrog, Nevada, and in the mineral belt. This property is now being developed by sinking a shaft in order to reach the copper-sulphide zone. Sinking was begun on May 1, 1906, at a point where the copper outcroppings appeared to be the strongest.

TRINITY COUNTY.

Quimby Gold Mining Company—This company at New Rover, J. A. Brent, manager, had new machinery for the quartz mill in course of construction in San Francisco at the time of the fire and it was destroyed. A Huntington mill at the mine will be operated this summer.

TUOLUMNE COUNTY.

Golden City—This old mine in Don Pedro district, formerly known as the Olson, is showing a steady increase of copper in the ore and it may be eventually worked for that purpose.

Davidson—The unwatering of the Davidson shaft will soon be finished, when it will be sunk to a much greater depth.

YUBA COUNTY.

Santa Rosa—Machinery for this mine at Rackerby is arriving and the mill will start up. Some very good ore is being taken out. F. E. Wright is superintendent.

COLORADO.

BOULDER COUNTY.

Highland Mary—A dam is being built for furnishing water to the new power plant, and machine drills are to be used. R. E. Thomas, Eldora, Colo., is superintendent.

X-Ray Group—Pittsburg people, through J. A. Wilson, of Eldora, have secured an option on this property and arrangements are being made to start up.

Tillie Buchtel—This mine, at Sunshine, Colo., has been sold to the Celura Mining Company, of which Mrs. C. C. Thurman, of Boulder, is president.

CLEAR CREEK COUNTY.

Transcontinental Mining, Transportation and Tunnel Company—A big strike is reported in the tunnel in East Argentine, with values in gold, silver, lead and zinc. R. C. Vidler, Georgetown, Colo., is manager.

Gem—A 100-h.p. hoist, to be operated by electric current, has been ordered for installation in the lateral from the Newhouse tunnel at the bottom of the Gem shaft. W. E. Renshaw, Idaho Springs, expects to leave for the East in a few days to complete arrangements for the installation of a cyanide equipment to the Newton Annex mill at Idaho Springs.

St. Regis Gold Mining Company—This company, capitalized at $1,000,000, is composed of Brooklyn, New York and Den-

ver men who have taken over the holdings of the Chicago Gold Mining and Tunnel Company. Frank Percy, of Idaho Springs, has been appointed superintendent.

Gold Fissure Group—Massachusetts and Rhode Island people are interested in a group at Empire. G. A. Bristol, treasurer of the company, has visited the property and announced that capital had been subscribed to resume active operations.

GILPIN COUNTY.

Imperial Gold Mining and Milling Company—Missouri and Indiana capitalists are interested, having purchased for $100,000, the Cronje and Cyrene groups in Pine and Wisconsin districts. L. H. Mountz, Apex, Colo., is manager and arrangements are to be made for the installation of a power plant.

Only Boy Group—A lease and bond for two years in the sum of $50,000 has been given by D. Munday, of Denver, to W. G. Sheldon on the Only Boy group of claims in the Eureka district.

Camp Grove—James C. Eagan, of New Jersey, has taken a two years' lease and option in the sum of $25,000 on the Camp Grove mine in Nevada district, and is expecting to start it up in conjunction with his Kansas group.

King of the Ranch—Denver people have taken a two years' lease and bond on this property in Eureka district, and are going to install machinery and develop this silver property.

LAS ANIMAS COUNTY.

Colorado Fuel and Iron Company—This company is opening a new colliery, which will be known as the Sisto mine. It is 24 miles above Trinidad. In order to reach the new property a spur from the Colorado & Wyoming line, two miles long, will be built by the company through Zarcilla cañon. Six openings will be made in the new property. All the slack from the mine will be converted into coke at the Segundo plant. The Quinto mine of the company was opened six months ago. It is understood that another coal producer will be opened this year, giving the company seven in that district.

MARYLAND.

ALLEGANY COUNTY.

Consolidation Coal Company—This company is making preparations to reopen the old Spruce Hill mine, near Vale Summit. The company will spend between $30,000 and $40,000 in making the new opening, and it is said between 3,000,000 and 4,000,000 tons of coal can be taken out. The mine was closed 24 years ago, on account of a fire in the workings.

NEW JERSEY.

MORRIS COUNTY.

Dickerson Mine—Shipments of ore are now being made from this mine, which has been worked for 125 years. A new shaft put down at Mine Hill is now down 100 ft., and a 12-ft. vein of ore has been struck. The mine is worked under lease by the Singer Sewing Machine Company.

NORTH CAROLINA.

CATAWBA COUNTY.

Catawba Gold Mine—At this mine under the management of Capt. A. J. Overton they are now washing 400 tons daily with a steady and uniform production which has been maintained for the past three years. The mass of ore, some 60 to 100 ft. in width, is of a soft decomposed nature, and is simply washed in a disintegrating machine where the gold is caught.

DAVIDSON COUNTY.

Hercules Gold and Copper Company—This company, which is operating at Cid, has reached the 600-ft. level with its main shaft, with a good showing of copper. The company has also another shaft down 450 ft. on the same vein in good ore. These two shafts are connected at the 200-ft. level and nearly connected at the 475 ft. level with several stopes already blocked out in ore. The company is running its 10-stamp mill regularly, making a high grade of concentrates which, for the present, it is shipping to the smelters at West Norfolk, Va. There is a standard gage railroad being built up to this plant. The mine can now be classed among the producers of the State. W. Cockreham is in charge as superintendent.

LINCOLN COUNTY.

Thomas A. Edison is expected in this county within a few days to inspect deposits of cobalt he has had opened. He is making the trip in his automobile, having left Orange, New Jersey on May 16.

ROWAN COUNTY.

Salisbury Copper Mine—At this mine the main shaft has reached a depth of 60 feet.

Union Copper Mine—This mine under the management of Captain Griswold, is paying well. The mine is shipping about 100 tons daily.

Sapphire Mining Company—This company composed of E. L. Hollyhead & Co., of Chicago, Ill., has struck the extension of the Gold Hill vein at that place and has found a good body of gold ore which is being treated by milling.

Gold Hill Copper Company—This company has struck a new body of ore on the 800-ft. level. It shows well in gold and copper.

Southern Copper Company—This is the name of a new organization formed to work mines near Gold Hill. The capital is $3,000,000. A. M. A. Richardson, of Paterson, N. J., is president; Otto Germer, of Cincinnati, Ohio, vice-president; W. M. Richardson, of New York, secretary. This enterprise is backed by Walter George Newman, who is pushing it in his usual vigorous manner.

NEVADA.

LINCOLN COUNTY.

Reports from Delamar are that a large and promising outrop of gold ore has been discovered about two miles from there. It is east of and in line with the Bamberger-Delamar and April Fool mines.

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PENNSYLVANIA.

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Total	9,832,606	10,298,062	I. 465,456
Sales	8,877,206	9,642,138	I. 764,932
Stocks, Dec. 31	955,400	655,924	D. 299,476

Production includes coal mined by the company, and coal bought from tenants and other small operators. The details of the sales in 1905 were as follows:

	Tons.	Receipts.	Per ton.
At mines	107,006	$ 227,634	$2.13
Company's supply	1,409,133	1,539,442	1.09
Local agencies	5,665,945	21,537,600	3.80
Foreign agencies	2,460,054	15,237,774	6.19
Total	9,642,138	$38,542,450	$4 00

Local agencies are those on the company's lines. Foreign agencies are those on connecting and other railroad lines. The total earnings and expenses are given below, the averages being calculated on the number of tons given in each line:

	Tons.	Amount.	Per ton.
Total sales	9,642,138	$38 542,450	$4 00
Barge earnings	899,396	228,595	0.25
Total earnings	9,642,138	$38,771,045	$4.02
Dec. in coal on hand,	299,476	$ 187 821	$0.63
Coal mined & bought,	9,342,662	16,826 651	1 80
Cost of coal	9,642,138	$17,014,472	$1.76
Transp'n, Co.'s lines,	7,998,220	$13,719,201	$1.72
" other	2,501,865	1,950,342	0.78
Barge transport	899,396	323,989	0.36
Total transport	9,642,138	$15,993,532	$1.66
Handling at agencies,	7,781,665	$ 909,473	$0.12
Commissions	2,676,729	516,045	0.19
Total selling	9,642,138	$ 1,425,518	$0.15
General expenses	.....	$ 118,447	$0.01
Improvements	.....	923,650	0.10
Total general	.....	1,042,097	$0.11
Total expenses	9,642,138	$35,475,619	$3.68
Net earnings	9,642,138	$ 3,295,426	$0.34

From this statement it appears that the expenses were 91.5 per cent. of the earn-

General Mining News.

Tennessee—This company's statement of production for 1905 is as follows:

	Tons.
Red ore mined	1,282,129
Brown ore mined	154,093
Total iron ore	1,436,232
Coal converted into coke	1,286,922
Coal used or sold	944,737
Total coal	2,231 659
Coke made	890,634
Limestone and dolomite	212 290
Pig iron made	529,036
Open-hearth steel ingots	246,55

The finished product from the Ensley steel works included 34,961 tons blooms and billets and 163,853 tons rails; a total of 198,814 tons. The finished material from the rolling mills at Bessemer was 15,129 tons bars and 10,037 tons plates; 25,166 tons in all.

ALABAMA.

JEFFERSON COUNTY.

The prospecting which has recently been done by H. F. DeBardeleben, the pioneer coal developer of Alabama, in the southern part of Jefferson county, a few miles from Bessemer, has been successful, and arrangements are now being made for the construction of a railroad line to the place.

ARIZONA.

MOHAVE COUNTY.

Chloride Gold Mining Company—This company's Samoa and Fourth of March mines are producing regularly ore of good value, which is being shipped to the Needles smelter. The ore is an iron and lead sulphide, carrying gold and silver values. The property is equipped with hoisting plant, two air compressors and rock drills. Development consists of one double-compartment shaft 300 ft. deep, and 4000 ft. of tunnels and drifts. About $200,000 worth of ore is now blocked out and more is being added as development progresses. There are 25 men employed at the mines. L. Hoffman is superintendent and manager.

CALIFORNIA.

AMADOR COUNTY.

Del Monte Mining Company—The directors have voted to increase the capital stock from $100,000 to $300,000 and at a special meeting to be held July 9 the stockholders will decide on the proposition.

Kennedy Mining and Milling Company—The placing of the new compressor for this property at Jackson is delayed for want of cement for the foundation, this being a very scarce article at present, notwithstanding the large production of California.

Mitchell—The lien-holders are operating this mine, having obtained judgment for their respective claims. Some 700 tons of ore which were on the dump are being milled.

BUTTE COUNTY.

Overlooked—This mine in the West Branch, near Magalia, it to be extensively developed this summer. Among other improvements a large concrete dam is to be built across the river.

CALAVERAS COUNTY.

San Andreas Blue Gravel—This property has been bonded to Geo. W. Kimball, of Placerville, together with the Rhoy and Salcedo places adjoining, which will give 3900 ft. of channel to work. The main shaft will be sunk to the channel bed and drifts run both ways along the channel; crosscuts will also be run. Work will commence at once.

EL DORADO COUNTY.

Roundout—This mine, Blair's district, has been bonded by Fairchild and Richards to Bingham and King, who will push the work of opening the property.

Cedar Creek— At this mine Superintendent F. M. Phelps has the new air compressor in operation and the tunnel is in one-third of the distance necessary to reach the channel.

INYO COUNTY.

Piute Cañon—From this district good ore is being taken out of the Neylon group, some of it a specimen character. The same may be said of the Leidy mine. There are large bodies of fair-grade ore in both these claims.

Argus Range Mining Company—This company has been organized in San Diego by Chas. W. and M. C. Robinson, of San Diego, and H. M. Barstow, E. M. Wardwell and L. D. Rich, of Los Angeles. The company will work some 14 claims located in Death Valley, the principal one of which is the Rosetta on which some work has been done, and from which some ore has been extracted.

Furnace Creek Copper Company—This company was incorporated in the State of Washington on May 15, 1905, with $1,250,000 authorized capital stock, in shares of $1 each, all full paid ($93,000 thereof being now in the treasury). The property is located in the Furnace Creek mining district, about 125 miles north of Ludlow, and consists of 22 claims (400 acres) and two fractions. The Tonopah & Tidewater Railroad, which is building from Ludlow, Col., to Bullfrog, Nev., has offered to build a 12-mile line to the Furnace Creek properties and the Las Vegas & Tonopah Railroad, an ally of the San Pedro, Los Angeles & Salt Lake Railway, has also offered to build a 30-mile line, reaching the mines, both upon request.

The ore carries copper, with light values of gold and silver. The erection of a 300-ton smelter is in contemplation. Trustees, P. Clark, Philip Greason, Denis Clark, Fred Burney and W. J. C. Wakefield.

SAN BERNARDINO COUNTY.

J. H. Hoff, acting for the Chloride Gold Mining Company, of Chloride, Arizona, has acquired the Iron Gossan group of claims, which consists of 11 full claims and one mill site—225 acres in all—situated in the northeast part of San Bernardino county, about 70 miles south of Bullfrog, Nevada, and in the mineral belt. This property is now being developed by sinking a shaft in order to reach the copper-sulphide zone. Sinking was begun on May 1, 1906, at a point where the copper outcroppings appeared to be the strongest.

TRINITY COUNTY.

Quimby Gold Mining Company—This company at New Rover, J. A. Brent, manager, had new machinery for the quartz mill in course of construction in San Francisco at the time of the fire and it was destroyed. A Huntington mill at the mine will be operated this summer.

TUOLUMNE COUNTY.

Golden City—This old mine in Don Pedro district, formerly known as the Olson, is showing a steady increase of copper in the ore and it may be eventually worked for that purpose.

Davidson—The unwatering of the Davidson shaft will soon be finished, when it will be sunk to a much greater depth.

YUBA COUNTY.

Santa Rosa—Machinery for this mine at Rackerby is arriving and the mill will start up. Some very good ore is being taken out. F. E. Wright is superintendent.

COLORADO.

BOULDER COUNTY.

Highland Mary—A dam is being built for furnishing water to the new power plant, and machine drills are to be used. R. E. Thomas, Eldora, Colo., is superintendent.

X-Ray Group—Pittsburg people, through J. A. Wilson, of Eldora, have secured an option on this property and arrangements are being made to start up.

Tillie Buchtel—This mine, at Sunshine, Colo., has been sold to the Celura Mining Company, of which Mrs. C. C. Thurman, of Boulder, is president.

CLEAR CREEK COUNTY.

Transcontinental Mining, Transportation and Tunnel Company—A big strike is reported in the tunnel in East Argentine, with values in gold, silver, lead and zinc. R. C. Vidler, Georgetown, Colo., is manager.

Gem—A 100-h.p. hoist, to be operated by electric current, has been ordered for installation in the lateral from the Newhouse tunnel at the bottom of the Gem shaft. W. E. Renshaw, Idaho Springs, expects to leave for the East in a few days to complete arrangements for the installation of a cyanide equipment to the Newton Annex mill at Idaho Springs.

St. Regis Gold Mining Company—This company, capitalized at $1,000,000, is composed of Brooklyn, New York and Den-

ver men who have taken over the holdings of the Chicago Gold Mining and Tunnel Company. Frank Percy, of Idaho Springs, has been appointed superintendent.

Gold Fissure Group—Massachusetts and Rhode Island people are interested in a group at Empire. G. A. Bristol, treasurer of the company, has visited the property and announced that capital had been subscribed to resume active operations.

GILPIN COUNTY.

Imperial Gold Mining and Milling Company—Missouri and Indiana capitalists are interested, having purchased for $100,000, the Cronje and Cyrene groups in Pine and Wisconsin districts. L. H. Mountz, Apex, Colo., is manager and arrangements are to be made for the installation of a power plant.

Only Boy Group—A lease and bond for two years in the sum of $50,000 has been given by D. Munday, of Denver, to W. G. Sheldon on the Only Boy group of claims in the Eureka district.

Camp Grove—James C. Eagan, of New Jersey, has taken a two years' lease and option in the sum of $25,000 on the Camp Grove mine in Nevada district, and is expecting to start it up in conjunction with his Kansas group.

King of the Ranch—Denver people have taken a two years' lease and bond on this property in Eureka district, and are going to install machinery and develop this silver property.

LAS ANIMAS COUNTY.

Colorado Fuel and Iron Company—This company is opening a new colliery, which will be known as the Sisto mine. It is 24 miles above Trinidad. In order to reach the new property a spur from the Colorado & Wyoming line, two miles long, will be built by the company through Zarcilla cañon. Six openings will be made in the new property. All the slack from the mine will be converted into coke at the Segundo plant. The Quinto mine of the company was opened six months ago. It is understood that another coal producer will be opened this year, giving the company seven in that district.

MARYLAND.

ALLEGANY COUNTY.

Consolidation Coal Company—This company is making preparations to reopen the old Spruce Hill mine, near Vale Summit. The company will spend between $30,000 and $40,000 in making the new opening, and it is said between 3,000,000 and 4,000,000 tons of coal can be taken out. The mine was closed 24 years ago, on account of a fire in the workings.

NEW JERSEY.

MORRIS COUNTY.

Dickerson Mine—Shipments of ore are now being made from this mine, which has been worked for 125 years. A new shaft put down at Mine Hill is now down 100 ft., and a 12-ft. vein of ore has been struck. The mine is worked under lease by the Singer Sewing Machine Company.

NORTH CAROLINA.

CATAWBA COUNTY.

Catawba Gold Mine—At this mine under the management of Capt. A. J. Overton they are now washing 400 tons daily with a steady and uniform production which has been maintained for the past three years. The mass of ore, some 60 to 100 ft. in width, is of a soft decomposed nature, and is simply washed in a disintegrating machine where the gold is caught.

DAVIDSON COUNTY.

Hercules Gold and Copper Company—This company, which is operating at Cid, has reached the 600-ft. level with its main shaft, with a good showing of copper. The company has also another shaft down 450 ft. on the same vein in good ore. These two shafts are connected at the 200-ft. level and nearly connected at the 475 ft. level with several stopes already blocked out in ore. The company is running its 10-stamp mill regularly, making a high grade of concentrates which, for the present, it is shipping to the smelters at West Norfolk, Va. There is a standard gage railroad being built up to this plant. The mine can now be classed among the producers of the State. W. Cockreham is in charge as superintendent.

LINCOLN COUNTY.

Thomas A. Edison is expected in this county within a few days to inspect deposits of cobalt he has had opened. He is making the trip in his automobile, having left Orange, New Jersey on May 16.

ROWAN COUNTY.

Salisbury Copper Mine—At this mine the main shaft has reached a depth of 60 feet.

Union Copper Mine—This mine under the management of Captain Griswold, is paying well. The mine is shipping about 100 tons daily.

Sapphire Mining Company—This company composed of E. L. Hollyhead & Co., of Chicago, Ill., has struck the extension of the Gold Hill vein at that place and has found a good body of gold ore which is being treated by milling.

Gold Hill Copper Company—This company has struck a new body of ore on the 800-ft. level. It shows well in gold and copper.

Southern Copper Company—This is the name of a new organization formed to work mines near Gold Hill. The capital is $3,000,000. A. M. A. Richardson, of Paterson, N. J., is president; Otto Germer, of Cincinnati, Ohio, vice-president; W. M. Richardson, of New York, secretary. This enterprise is backed by Walter George Newman, who is pushing it in his usual vigorous manner.

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ings. The expenses were divided as follows: Mining and preparing coal, 47.8 per cent.; transportation, 45.1; selling expenses, 4.1; general expenses and colliery improvements, 3.0 per cent. The colliery improvements made during the year are summed up as follows:

"The water hoisting plant in the Keyser Valley has been completed. It is operated not only electrically but automatically and has a daily hoisting capacity of 6,000,000 gal. Its installation has resulted in the elimination of a large number of pumps and pumping stations. The Nanticoke power plant, designed to furnish electric power for the mines in the Wilkes-Barre district, was completed with all the modern improvements in the way of water-tube boilers, steam turbines and electric generators. The Truesdale breaker and washery annex were put in operation during the year. This is an electrically operated breaker with a capacity of 4000 tons per day. The opening up of this new mine will enable the company to increase still further its production, should the market require. Many other improvements of a substantial and permanent character have been made, such as renewing hoisting-shaft towers with steel instead of wood; re-lining shafts with concrete; building washery annexes to breakers in order to reclaim the smaller sizes of coal; and installing fire pumps, fire lines and hydrants, also additional equipment to protect breakers and other properties from fires. The company has continued during the past year its policy of purchasing leases under which it has been heretofore paying royalties, and has acquired in this way and in the purchase of the National colliery, approximately 4,290,000 tons of coal in fee."

Freeman Coal Company—This company has bought the coal-mining rights on 475 acres of land owned by D. C. Vosburg, near Mill City, in Wyoming county.

BITUMINOUS COAL.

Orient Coke Company—At the annual meeting last week these officers were elected: Julian Kennedy, president; Robert Bentley, vice-president; Reid Kennedy, secretary and treasurer; O. W. Kennedy, general manager.

Waltersburg Coke Company—This company, with a capitalization of $200,000, has effected an organization at Uniontown, by electing W. A. Stone, president; A. Gaddis, vice-president; George H. Bortz, secretary; W. C. Black, treasurer. The company recently purchased 150 acres of coal from the Pittsburg Coal Company and will build 115 ovens.

Washington County Coal Company—This company expects to have its mines in operation by July. The company is developing 13,000 acres of coal land, with a 5½-ft. vein, near Patterson Mills. Two miles of railroad sidings, connected with the Wabash railroad, have been laid and the tipple is in course of construction. An output of 2000 tons per day is being provided for. The main office of the company is in the Park building, Pittsburg.

SOUTH DAKOTA.

LAWRENCE COUNTY.

Globe—Work has commenced on the tunnel, which will be run 400 ft. into the hill to tap the orebody. The work will be done by machine drills. The work of installing the Ogden process in the mill has also begun. The main workings are at present full of water, and the task of pumping it out will not be begun for some time yet.

Imperial—The drift that has been run between the Rudolph claim of this property and the Gunnison, of the Dakota, has just been completed, and serves as a good outlet for the ore. Another tunnel will now be driven from the Gunnison workings to the Clinton. When completed this will give the Imperial a clear passage from Squaw creek to the head of Nevada gulch.

Aerial Tramway Company—There is a proposition before the mining men of this city and the Business Men's club, of Deadwood, to construct an aerial tramway between Deadwood and Bald mountain for the purpose of bringing ores from the latter place to the mills in Deadwood. The distance would be between seven and eight miles, and the cost of construction from $13,000 to $14,000 a mile. As Bald mountain is 1800 ft. higher than Deadwood, the tramway could be operated at small expense. At present the Horseshoe, Golden Reward, Imperial and Dakota companies, with ground at Bald mountain, have all their mills located in or about Deadwood. The company expects to handle ore for about one-third the cost of handling it now by rail. A central station would be built at Whitetail and branch lines from the various mining properties would come in here.

UTAH.

BEAVER COUNTY.

Black Rock—The shaft at this property, in the Beaver Lake district, now 200 ft. deep, is to be sunk 100 ft. further.

SALT LAKE COUNTY.

Columbus Extension—The driving of a long tunnel on this property at Alta has commenced. A compressor plant and power drills will be installed at once.

Shawmut Consolidated Copper Company—At the annual meeting in Boston last week, the following directors were chosen: Edward J. Mayo, Foxcroft, Me.; B. W. Currier, Robert A. Jackson, S. L. Powers, Wm. Rotch, Leslie C. Wead, S. Herbert Williams, Boston; John R. Thayer, Worcester, Mass.; Alexander Chandler, New York. The board elected Leslie C. Wead, president; Wm. Rotch, vice-president; Robert A. Jackson, secretary and treasurer.

SUMMIT COUNTY.

Jupiter—Shipments are about to be resumed from this property.

Odin—Developments at this property continue to be of an encouraging character. Some bodies of mill ore have been opened.

Ontario Tunnel—The work of drifting around the caved section of this adit is progressing slowly, but cautiously; it may be many months yet before the great avenue is cleared.

TOOELE COUNTY.

Honerine—The matter of resuming operations at this company's mill will be considered at a meeting of directors next week. The drain tunnel is now 10,200 ft. in the mountain.

WASHINGTON.

FERRY COUNTY.

Ben Hur—The smelter returns from three carloads of ore amounted to more than all of last month's expenses of the mine. For the past three months the ordinary quantity shipped was from 10 to 12 carloads a month. The winze, about 10 ft. south of the shaft, is down 50 ft., and shows the vein 5 ft. in width. There are five carloads of ore from the winze now at the smelter, which s expected to run better than any previously shipped from the mine.

Hidden Wealth—The shaft at 15 ft. deep shows the vein 52 in. wide, with about 6 in. of talc on each wall. The ore carries 5.4 per cent. copper, besides gold and silver. The tunnel work will shortly be resumed, when it will require 90 ft. to strike the vein 150 ft. down.

STEVENS COUNTY.

Reports from Chewelah district show greater activity than was ever before known. Deals are being negotiated for five or six mining properties, and a large amount of exploratory work is expected to be started this summer.

WEST VIRGINIA.

BARBOUR COUNTY.

Bardolf Coal and Coke Company—Charles F. Teter, Clarence E. Robinson and Samuel A. Moore, of Philippi, W. Va., and Edwin F. Hartley and K. T. Deegan, of Fairmont, W. Va., have incorporated the Bardolf Coal and Coke Company, of Philippi, with a capital stock of $200,000 for the purpose of operating coal mines and manufacturing coke.

RITCHIE COUNTY.

Helen Coal Company—This company has been organized at Pennsboro, and will begin the development of coal property during the summer. Officers of the company are M. K. Doty, president; I. L. Fordyce, vice-president; S. M. Cunningham, secretary; C. R. Cunningham, treasurer; E. B. Hill, general manager, and J. V. Dutts, superintendent.

Foreign Mining News.

CANADA.

ONTARIO.

Hastings County—Much activity prevails this season in the Hastings county mining district. At El Dorado Copper mine a new smelter plant is being installed, which will be in operation next month. A 10-stamp mill, and a 110-h.p. return tubular boiler have been ordered. The depth of the deposit is being tested by diamond drill and should the result be sufficiently encouraging, the owners of other properties in the neighborhood with similar surface indications will begin development work. W. S. Wellington, owner of the Madoc talc mine, has received an order from New York for 650 tons of talc. He will shortly put in a mill to grind talc for the home market. The mica mines are being actively worked. A crystal of rough mica weighing 32½ lb. has been taken from Edward Smith's mine, Burgess township. Wm. McLaren's mine in the same township is yielding well. The Benjamin mine, near Sydenham, has been sold to a British syndicate.

QUEBEC.

A mining boom is beginning in northern Quebec, which has a continuation of the mineral belt of northern Ontario. The whole country from Lake Timiskaming on the western boundary as far east as the region north of Lake St. John is full of prospectors. The principal center of the movement is the mineral district north of Lake Chibogamoo, and toward James bay. Much excitement has been occasioned by the return to Montreal of a prospector sent out in that direction by the Chibogamoo Gold and Asbestos Mining Company, the leading members of which are J. A. Jacobs and Peter McKenzie of Montreal, bringing with him gold nuggets to the value of $4000. Strict secrecy is observed by the company as to the immediate locality where the find was made and it is actively taking steps to secure mining locations. Other prospectors have reported to the Chibogamoo Company, the discovery of extensive copper deposits between the Rupert and Nottaway rivers. A rush to the Chibogamoo is anticipated, when the section of the Grand Trunk Pacific now under contract, which will run about 100 miles to the south is completed.

BRITISH COLUMBIA.

More than 20,000 tons of ore were treated at the Dominion Copper Company's smelter at Boundary Falls during April, which was the largest quantity yet reduced in one month at those works. Shipments of ore from the company's Brooklyn, Stemwinder and Rawhide mines in Phoenix camp, in April totalled 15,671 tons and from its Sunset mine in Deadwood camp 4331 tons, together 20,002 tons. Some custom ore was also received at its smelter. An extraordinary meeting of the shareholders of the company has been called to consider a resolution to be submitted by the directors approving the issuance and sale of $300,000 par value of the company's first mortgage bonds (being the balance of an authorized issue of $1,000,000), and 228,000 shares of its stock of the par value of $10 each. In a circular issued by the directors it is stated that the proceeds of sale of bonds and stock as above, will be devoted to purchase of additional mining property, new equipment, development work, enlargement of smelting plant, making railroad connections, and possibly to construction of a new smelter.

Tonnage figures compiled by the Phoenix *Pioneer* show the ore output for four months to May 1 to have totalled 430,243 tons. The monthly totals were:

January	104,378
February	105,429
March	112,638
April	107,798
Total	430,243

Approximate output of the several shippers was as follows: Granby Company, 285,000 tons; Dominion Copper Company, 77,000 tons; British Columbia Copper Company, 61,000 tons; Oro Denoro, 6000 tons; sundry small mines, 1200 tons.

MEXICO.

OAXACA.

In Oaxaca, the San Juan Taviche Mining Company, which Chas. A. Hamilton controls, and whose properties are some seven miles from Ocotlan, has encountered a body of ore, carrying both gold and silver. In this, as in others under Mr. Hamilton's control, shipments are being curtailed and the ore held for the new Oaxaca smelter, in which Mr. Hamilton is also interested. For this plant, the complete outfit and machinery has been ordered from the Power and Machinery Company, of Cudahy, Wis., so that it is expected it will be in working order before the end of this year. The railroad of 28 km., between Ocotlan and San Geronimo Taviche, is also being built by the Hamilton interests.

MEXICO.

In the State of Mexico, Chas. T. Boehm and associates, of Toluca, are opening up the old Germania, near Sultepec, and some 12 pertinencias at Santa Cruz, about 25 miles from Sultepec. At the camp of El Oro, fine ore has been encountered in the Chihuahua mine, and in El Globo or Pañchito. Engineers are making examinations of the Victoria y Anexas for a London syndicate.

SONORA.

Cananea Consolidated Copper Company—The new ore-spreading beds of this company are nearly ready for use. They will be sufficient to handle almost the entire amount of ore smelted, and will effect a great saving in labor and time.

Buckeye Mining Company—Ore running high in silver is being taken out of the mine of this company at Ranchita de Aguilar, near Cumpas, Sonora. Some 1700 pack animals are engaged in this work and 1400 sacks of ore are being taken out daily. These are taken to the smelter of the company a few miles away.

AFRICA.

TRANSVAAL.

Quite a heated discussion has been going on for some time regarding the system of centralization as carried out on the mines of the Rand. The press has denounced the scheme more or less, holding that in a group of mines where centralization is overdone, the managers on the mines are hampered by the interference of head office officials, their individuality is crushed out, and they become mere automata, chiefly interested in drawing their checks every month. The best managers leave the centralization mines when a better opening comes along.

After this heated discussion it is interesting to note that the General Mining and Finance Corporation, under the technical control of Messrs. G. A. and H. S. Denny, have decided to "decentralize" their central administration. This corporation had the centralization idea strongly, and the determination to abandon the scheme after a long trial, speaks volumes for the contentions of the press.

How the General Mining and Finance Corporation intends running its mines is not known, but it is certain that the manager on the mine will have full responsibility for the running of his property.

The local press goes further in its crusade against high working costs, and recommends that a system of bonuses should be instituted on the mines; that the management should be paid on increased profits and reduced working costs

BORNEO.

The British North Borneo Company has made contracts to deliver 18,000 tons of first-grade manganese ore and 12,000 tons of second-grade during 1905. The purchasers also have the option of taking additional quantities of both grades, provided greater output can be secured from the mines.

CENTRAL AMERICA.

COSTA RICA.

Montezuma Mine—At this mine at Miramar, work is to be carried out on a large scale. A new mill and cyanide plant, to handle 250 to 300 tons daily. R. C. Shaw, formerly in charge of the mine for four years, has been appointed general manager for the new company, and has assumed charge.

SOUTH AMERICA.

PERU.

The Northern Railway and Coalfields Company, of Peru, is preparing to build

168 miles of railroad from Chimbote to Recuay. The line will pass through the coal field of the Santa Valley. F. J. Schafer, of Chimbote, holds the concession for the railroad and also owns the coal mines and the pier at the port of Chimbote. Sir Westminster Pearson, of London, is contractor for the road.

Coal Trade Review.

NEW YORK, May 30.

The main point of discussion in the coal trade continues to be the evidence collected as to the dealings of the subordinate officers of the Pennsylvania Railroad with the coal shippers on the line. The company seems disposed to investigate the matter thoroughly, and President Cassatt is reported to be on his way back from Europe, in order to give immediate attention to the proposed inquiry. Much of what has been brought out is not really new to the trade, though the full extent of the trouble was hardly appreciated.

In the West, the Ohio operators seem to be waiting the result of the attempt to open some mines with non-union labor. The Indiana situation is explained elsewhere. In Illinois negotiations still continue, with doubt as to the immediate result.

The Michigan mines and operators have failed to agree in conference. Any operator, however, can resume by signing the 1903 scale, and it is said that some will do so.

A despatch from Chicago, May 29 says: "In convention today, the coal operators of Illinois decided to yield to the demands of the miners for the scale of 1903. It is declared that by the beginning of next week mining will be resumed in Illinois, with union men.

"In return for the restoration of the 1903 scale the Illinois miners have agreed to pay the wages of shot-firers and to ask for the repeal of the law by the next Legislature. They have agreed also to indemnify the operators for the loss sustained through the action of pit committees in calling unauthorized strikes. Under the new agreement the union will be responsible for the conduct of the miners and guarantees that no such strikes will be permitted in the future."

COAL TRAFFIC NOTES.

The total coal and coke traffic originating on all lines of the Pennsylvania Railroad east of Pittsburg and Erie for the year to May 19 was as follows, in short tons:

	1905.	1906.	Changes.
Anthracite..	1,770,528	1,506,684	D. 263,844
Bituminous.....	10,559,619	12,356,088	I. 1,796,469
Coke.....	4,217,807	4,877,880	I. 660,073
Total.....	16,547,954	18,740,652	I. 2,192,698

Shipments of Broad Top coal over the Huntingdon & Broad Top railroad for the week ending May 26 were 12,754 tons; for the year to May 26 they were 324,551 tons.

New York. May 30.

ANTHRACITE.

The hard-coal market has recovered its normal condition as far as shipments are concerned; the coal that is now coming forward is, however. mainly taken from stock piles, with very little fresh coal. Mining has not yet recovered from the interruption of the strike, and it will probably be at a disadvantage until the end of the month. Many of the hard-coal miners went into the bituminous region at the approach of labor trouble, and will have to spend at least one month there to draw their pay.

Prices on the domestic sizes will advance by 10c. per ton this week and will remain throughout June at the following prices: $4.45 for broken and $4.70 for domestic sizes. For steam sizes; $3 for pea; $2.25@2.50 for buckwheat; $1.45@1.50 for rice and $1.30@1.35 for barley f.o.b. New York harbor shipping points.

BITUMINOUS.

The Atlantic seaboard soft-coal trade is quieting down rapidly. Orders for current business seem to be scarce and even contract business is being curtailed to such an extent that most of the operators are running their mines on part time. Consumers appear anxious to use up some of the surplus stocks that they were at such pains to accumulate when trouble was threatened.

Trade in the far East is quiet and consumers are not taking on coal as fast as producers would like, even with the inducement of the present low ocean freight rates. The Sound is delaying shipments and the small sizes of anthracite are also having a retarding effect on the soft-coal business of this territory. New York harbor is receiving only comparatively small amounts of coal.

All-rail trade is not active, although more orders for this kind of business are forthcoming than for tidewater business. Car supply is up to demands notwithstanding the sudden demand from the anthracite districts. Transportation is slow, but nobody complains.

Vessels in the coastwise market are in fair supply at the following quoted rates from Philadelphia: To Boston, Salem and Portland, 65c.; to Lynn, Newburyport and Gardiner, 75c.; to Portsmouth and Bath, 70c.; to the Sound, 60c. per ton.

Birmingham. May 28.

Coal operations in Alabama are not slacking up. There is a demand for every ton of coal that can be mined. Good prices obtain. The railroads are furnishing cars better now than for some time and the output at the mines as a consequence is improving.

The Pratt Consolidated Coal Company expects to increase its production in a few weeks by some 2500 tons a day. This company is producing 10,000 tons of coal a day and a large amount of development is under way.

Coke is in good demand, but the production is a little off for the present.

Chicago. May 28.

Though prices of western bituminous continue high, there is little coal being disposed of in the open market, the usual summer dullness being at hand, while there are still stores of steam grades in many railroad and factory yards. Consumers are hopeful of a speedy ending of labor troubles at the mines and will use up their last supplies before ordering more. Anthracite is dull, and probably cannot revive before September, the times being too prosperous to make consumers feel that they should buy before they need the coal for immediate consumption.

Illinois coal is somewhat scarcer, shipments being restricted from the stocks at the mines in the southern part of the State which have been sending in comparatively large supplies. Run-of-mine from Illinois and Indiana mines brings about $2.50 and screenings practically the same price, though the quotations are speculative and the amount paid is dependant on who has the coal and how it is needed by the consumer.

Hocking is not in large supply or demand; the trade is normally light at this season of the year, with the standard price, $3.40, probably obtained on most sales. Smokeless, while the total volume of sales is increasing steadily, is quiet, the standard price of $3.30 representing sales under ordinary conditions. Youghiogheny brings $3@3.35 and as usual at this time of the year is not in heavy demand. Fairmont is quoted at $3@3.15, though the price has been cut 10 or 15c. under the influence of heavy shipments.

With the prospect of a lessening demand due to the season and an increase of supplies from eastern mines, it is apparent there will not be any hardship to manufacturing or railroad interests for several weeks to come, even should there be no settlement of the strike at western mines.

Cleveland. May 28.

The movement of coal up the lakes is still hampered by the shortage, which depends largely upon the continued strike in the middle district, which has now turned into a lock-out. The mines are trying to use non-union labor. This is shortening the supply for lake shipment. Some of the shippers are getting ready for a heavier movement a little later on, and are planning to make contracts with vessel concerns, on the old basis of 40c. to Lake Michigan and 30c. to the head of the lakes. The prospects for wild rates are not sufficiently inviting to cause the shippers to depend upon that class of tonnage. Wild boats now are overabundant, but a little later on they will be scarce, when the movement is in full swing. The demands of the lake trade are holding domestic prices about steady,

on the basis of $1@1.10 at the mines for mine-run coal, with slack selling about 75@80c. at the mines. Lake fuel coal is higher by 10 per cent. than it was last year. Most of the boats are compelled to use lake three-quarters, and pay $2.60 f.o.b. boats for their supply. The Pittsburg Coal Company is planning to erect a big fueling dock at the Soo. This will enable boats making year contracts with that concern to get mine-run coal at a lower figure. The movement for the year up the lakes will likely be large in view of the enormous northwestern demand, which is in prospect for the remainder of the year.

The coke market is peculiarly strong just now. Furnace coke is short and the demand exceptionally strong. The result is that prices of furnace coke are for the first time in several months even with foundry at $3 at the oven. The best grades of 72-hour foundry coke are also in good demand but the supply is adequate and the market is about steady at $3 at the oven.

Indianapolis. May 27.

The suspension of coal mining by the larger number of operators continues in Indiana. The miners refused to arbitrate the differences existing between the union and the operators of Indiana when this course was proposed at a recent meeting at Terre Haute. The operators demanded arbitration, telling the miners they must arbitrate or admit themselves forever opposed to arbitration. The miners give as a reason for refusing that it would not be possible to get a conciliation board that would give the miners justice in this particular case, and assert that for the result to be fair to the miners all the evidence would have to be gleaned from the Indiana fields alone. The miners then proposed that the whole matter be referred to a joint scale committee of 12 miners and 12 operators. This proposition was accepted and this joint committee began its session May 25. The prospects for an agreement seem greater than at any time since the strike was declared. Both operators and miners are earnestly trying to reach a settlement. The stock of coal has been nearly cleaned up and coal is being sent into Indiana from Kentucky and West Virginia. The operators feel that the longer a settlement is delayed the harder it will be for Indiana interests to recover. The operators are demanding that certain conditions of employment must be changed. They have given the miners to understand that price will not count with them, if the conditions are made satisfactory. At present there is no indication that the bituminous operators will attempt to run their mines non-union, but in case this conference fails it is difficult to state what will be attempted. It is understood that the operators in Indiana who have signed the 1903 scale did so with the promise that they should have the benefit of any terms finally agreed upon, hence, the holding out for better terms cannot be charged against the operators with a view of advantage over those who have signed.

L. P. McCormack, State Labor Commissioner, in discussing the disagreement said, "that statistics show that the number of mines in the State has doubled within the last few years, while the amount of business which requires coal and the demand for coal has not doubled. Though Indiana is mine rich, there isn't so much profit in mining now." Mr. McCormack says that he has not heard of a single industry or factory closing down on account of shortage of coal. With a few exceptions the miners are the only people out of work as a result of the strike.

Pittsburg. May 29.

Coal—The coal market shows but little change compared with a week ago. All the mines are in full operation and there is a good supply of railroad cars. The Pittsburg Coal Company continues heavy shipments to lake ports for the Northwestern market. Some independent interests that are selling their lake coal to the leading concern are now forming a lake shipping company. The new company will include some of the prominent independents. It is expected that plans will be completed within the next few weeks. Prices remain about the same, on a basis of $1.15 a ton for mine-run coal at the mine.

Connellsville Coke—The market is easier and strictly Connellsville coke is quoted at $2.40@2.50 and foundry at $2.65 @2.70. The production in the Connellsville region for the week amounted to about 272,000 tons and the shipments to 12,652 cars. The combined production of the Connellsville and Masontown fields amounted to over 355,000 tons.

Foreign Coal Trade.

May 30.

Exports of coal from Germany for the three months ending March 31 were, in metric tons:

	1905.	1906.	Changes.
Coal	4,097,854	5,217,034	I. 1,119,180
Brown coal	4,561	5,033	I. 472
Total	4,102,415	5,222,067	I. 1,119,652

Exports of coke were 239,447 tons; of briquets, 64,975 tons; of briquets made from peat, 713 tons. The chief exports of coal were to Austria, Holland, Belgium and France.

Imports of coal into Germany for the three months ending March 31 were, in metric tons:

	1905.	1906.	Changes.
Coal	2,530,517	1,803,758	D. 726,759
Brown coal	2,008,014	1,962,210	D. 45,804
Total	4,538,531	3,765,968	D. 772,563

Imports of coke this year were 42,278 tons; of briquets, 12,393 tons; of briquets made from peat, 2809 tons. The coal imported came chiefly from Great Britain; while the brown coal or lignite was all from Austria.

Iron Trade Review.

NEW YORK, May 30.

The iron trade generally appears to be in still better shape than at last reports. Buyers seem to have given up expectation of weakening in prices with the approach of summer. The molders' strike has caused some hesitation in the buying of foundry iron, but this seems to be the only weak point in the market.

Structural material is still in strong demand. Some large contracts have been let this week, as noted in our local letters, and others are pending. Rail orders continue to be placed, and the rail mills already have a large tonnage to carry over into 1907.

The Lake ore shipments are now unobstructed. The tonnage coming down in May was large, in spite of the delay in shipments caused by the strike, and the June shipments are expected to be heavy.

English papers report negotiations for basic pig iron on Canadian account. It is said that these negotiations have been undertaken with a view to the establishment of new steel works in Canada.

Birmingham. May 28.

There were no special incidents in the pig-iron situation in the Birmingham district during the past week. The demand is still taking up the production. Two furnaces are slated to go into blast this week; Thomas furnace, of the Republic Iron and Steel Company, and City furnace, of the Sloss-Sheffield Steel and Iron Company. Colonel T. G. Bush, president of the Alabama Consolidated Coal and Iron Company, announces that the new furnace of his company at Gadsden, will shortly be completed. On account of a scarcity of charcoal, the Shelby Iron Company will hardly be ready to blow in the furnace at Shelby until about June 15. There is a good inquiry for charcoal iron, and when once started up the furnace will have a steady run. The home consumption of iron is growing. The cast-iron pipemakers are among the larger consumers in this section. The plant of the American Cast Iron Pipe Company is now in operation at North Birmingham. During the past week or so several large sized orders were accepted by Birmingham district pipemakers.

The following quotations prevail; No. 1 foundry, $14.25@14.50; No. 2 foundry, $14; No. 3 foundry, $13.50; No. 4 foundry, $13; gray forge, $12.50; No. 1 soft, $14.50; No. 2 soft, $14.

There is great activity in steel. The plants at Ensley and Gadsden are working steadily. The probable make of rails for the better portion of 1907 at the Ensley plant has been sold, Southern railroads being extensive purchasers.

Many rumors prevail concerning improvements at the steel plant at Ensley. One report has it that the Tennessee Coal, Iron and Railroad Company intends building a railroad line to Thomas and using molten basic iron from that place in the manufacture of steel at Ensley. The negotiations being carried on looking to the purchase by the Tennessee Company, of the Birmingham Southern Railroad, which is made up of lines which were formerly owned by the Tennessee Company, and which run to the various plants of that company, will probably be concluded satisfactorily.

The announcement is made of the resignation of J. A. Durfee, the general superintendent of the Ensley division of the Tennessee Company. Mr. Durfee will return to the Colorado Fuel and Iron Company. A number of changes have been made in the various departments under the concentration plan of the Tennessee-Republic Company. The new vice-president and general manager, Frank H. Crockard, is expected to arrive here in a few days now to take active charge.

Chicago. May 28.

Steadiness and moderate sales mark the iron market generally. If there is no such boom as was hoped for by enthusiasts at the beginning of the year, there has been no relapse, and conditions are better for beginning the usually dull summer season than in previous years. The pig-iron market is still affected noticeably by the molders' strike, and on account of it prices are a trifle easier. Foundries in Chicago and Milwaukee are generally closed, but some of the smaller establishments have made a settlement with the molders and are doing business.

Contract sales of both Northern and Southern iron, however, proceed with but slight falling off; the demand for iron on quick delivery is most affected, such lots being required to fill out the unexpected increase of business of the foundries. Northern iron brings $18.50@18.75, and Southern $13.75@14 Birmingham or $17.65 @17.90 Chicago for No. 2 on contract business. There is a good demand for Lake Superior charcoal iron at $19. Sales on contracts are still moderate in size, though there is much iron yet to be contracted for to supply the needs of the third quarter. The volume of sales is not keeping pace with the expansion of the business of melters, and it is evident that they are still holding off in the hope of a depression of the market in the summer.

Sales of iron and steel products are in general good. Rails are in somewhat less demand, though the local mills have booked practically their capacity for the year 1907. Structural steel is in fair demand and heavy hardware supplies steady. The market for these products bids fair to be good for an indefinite time.

Coke is dull, with Connellsville selling as low as $5.15, though the best holds up to $5.40.

Cleveland. May 22.

Iron Ore—The despatch has been unusually good at both upper and lower lake ports, hence the movement of ore during May has been large. The statistics have not been compiled, but preliminary estimates indicate a movement of about 4,000,000 tons. This is accounted for by the rapid work at Lake Erie docks, the free supply at the head of the lakes, when the strike was over, and the fact that part of the fleet and five of the docks continued active all through the strike, lasting 10 days. The movement up to May 31 therefore, it is likely to show a total of approximately 5,500,000 tons. Wild charters have been free at the old rates of 75c. from Duluth to Ohio ports; 70c. from Marquette and 60c. from Escanaba.

Pig Iron—The demand for foundry iron has been steady but not large. The steady buying, however, has given the furnaces a good tonnage, and there has been a tendency to advance prices. Most of the iron is now sold at $16 in the Valleys for No. 2, but other lots have sold at $16@16.50 in the Valleys. Basic is in fair demand at $17, with talk of higher prices. Bessemer is sold at $17.25, while most of the furnaces are holding at $17.50 and some higher. The Southern furnaces are asking $14 Birmingham for No. 2, and are making some sales in this territory, regardless of the $4.10 freight rate to be added.

Finished Material—The scarcity of sheet-bars and the consequent curtailment of production has brought about an advance in the price of sheets, which affects both mill sales and lots out of stock. The advance is about an even $2. Billets are still scarce, with the forging quality selling at $35@36 at the mills, Pittsburg. Steel bars are steady at 1.50, although some buyers do not like the discrimination in favor of the agricultural implement works. Bar iron is weak at 1.50, Pittsburg. Orders on structural are more plentiful and specifications are heavy. Tractions are buying rails, but finding it difficult to get deliveries.

New York. May 30.

Pig Iron—Selling has been less active, and the market easier for foundry iron; but there is still a good deal of business in small lots, which make up a considerable total.

For Northern iron in large lots we quote: No. 1X foundry, $18.50@19; No. 2X, $18@18.50; No. 2 plain, $17.50@18; forge, $16.25@16.75. Southern iron is held firmly by the larger companies on the basis of $14 Birmingham for No. 2, but 25c. may be conceded on a large order. For large lots on dock, New York prices are: No. 1 foundry, $18@18.50; No. 2, $17.50@18; No. 3, $17@17.50; No. 4, $16.25@17; No. 1 soft, $18.25@18.50; No. 2 soft, $17.50@18; gray forge, $16@16.50. Basic is held at $19 for Virginia, $18.50 for Alabama and $18@18.25 for Northern.

Cast-Iron Pipe—Prices are steady, the present basis being $30.50 per net ton for 6-in. pipe in carload lots, at tidewater points. The foundries are full of work.

Bars—Business is good, and prices are steady. Sales are at 1.645c. for common iron bars, and 1.695c. for refined iron. Steel bars are 1.645c. tidewater. Store trade is steady at 2c. delivered.

Plates—Steel plates are in fair demand. Tank plates are nominally 1.745@1.825c.; flange and boiler, 1.845@1.945c.; universal and sheared plates, 1.745@1.845c. according to width. Sales here are chiefly in small lots.

Structural Material—Prices are nominally unchanged. Beams under 15 in. are 1.845c. for large lots; over 15 in., 1.895c.; angle and channels, 1.845c., tidewater delivery. A large part of the business here is done by jobbers. The American Bridge Company has taken the contract for the Hudson Tunnel terminal in New York, which will take some 28,000 tons of material.

Steel Rails—No change in standard sections. Light rails are in steady demand; prices are a shade higher, from $28 for 25-lb. up to $34 for 12-lb. rails. The demand for trolley rails is good. The price of $28 for standard sections is being accepted for orders running into 1907 deliveries. Open-hearth rails are quoted at $29 for standard sections.

Old Material—Business is fair, but dealers are not ready to make concessions; No. 1 railroad wrought is $18.75@19.50; No. 1 yard wrought can be had for $17@18; machinery cast, $14@14.50; heavy steel melting scrap, $16@16.50. These prices are on cars, Jersey City or other terminal delivery.

Philadelphia. May 29.

Pig Iron—The market has taken another twist, as indicated in sales of over 20,000 tons of basic pig, with inquiries for as much more, it is asserted today, which will probably result in contracts. There is also considerable doing in pipe iron. Other kinds of iron have not been neglected by any means, but the great activity has been confined to basic pipe iron. The inquiries for forge that have been hovering around the market for several days turned into business late last week, and the tone of the market, therefore, is very strong, with a decided tendency to more premiums for early delivery. There have been heavy dealings in bessemer pig, and it would not be safe to prognosticate the extent of this demand during the next two or three weeks. All of the big foundries within this territory are practically in the market, although in several instances the fact is shown merely by in-

quiries. The situation has improved materially, and all intimations of weakness have disappeared. Quotations for No. 1X foundry are $19.50; No. 2X $18.50; No. 2 plain $18.50; standard forge $16.50 and bessemer, $20; basic, $17.75; malleable, $19.50.

Steel Billets—A little drop in billets has led to several large transactions on a basis of about $28. A great deal of work is in sight, and the billet market is very strong. Forging billets are quoted at $32.50.

Bars—But little business has come to hand this week, and the output is being gradually reduced. Some shading of quotations has been mentioned, and an easing off of prices is not improbable, provided the buyers want large lots.

Sheets—Some of the larger sheet orders placed early in the spring are pretty well filled, and some buyers are manifesting a little unwillingness to place new orders promptly.

Pipes and Tubes—It has been intimated that the increasing tube capacity will shortly have an influence upon prices and that autumn business will be done at a lower figure. While there is some reason to anticipate such an outcome, the business that is being sent to the mills does not indicate that any weakening tendency is in sight. There is a large amount of work in sight for merchant pipe. Though there are no substantial facts on which to base this statement the feeling prevails that boiler tubes have been their highest point.

Plates—A great deal of business has recently appeared for both iron and steel plate, and if the new enterprises now almost ready for supplies do not meet with any discouragement our people believe there will be quite an influx for steel plates before the summer opens. The supply of small orders is still up to the average. The main point about this and some other branches of the steel industry at this time is that there is a spirit of delay manifested in the placing of large orders, the reason of which is not made apparent to outsiders.

Structural Material—There is renewed activity in the demand for structural material for all kinds of construction work, and the mills have had a good deal of business submitted to them since last week, most of which was hard to dispose of, as the material is wanted within a few weeks. A great deal of bridge work is coming in sight, which it was thought a month ago would not be presented until summer. The effect has been to strengthen the market.

Steel Rails—Some very heavy orders for steel rails have been placed within a few days, most of them for delivery next year. The largest order was for 50,000 tons.

Scrap—The market for scrap has been quiet for a week or so, notwithstanding some recent indications of heavy sales. The leading scrap people think their position is strong, and they are acting along this line. A good deal of scrap is available which the scrap buyers are not picking up with their usual promptness. This is the only weak spot in the whole situation. Choice railroad scrap has been offered as low as $18.75 per ton.

Pittsburg. May 28.

The pig-iron market is more active this week. A sharp buying movement has begun, and some important contracts for second-half delivery in all grades are expected to be placed before the close of the week. Some sales just concluded have established firmer prices, and it is very likely that foundry prices, which have been weak lately, will be advanced. The Massillon independent pipe interests came into the market last week for from 20,000 to 35,000 tons of Northern and Southern foundry and forge iron for deliveries beginning in July. It is expected the contracts will be closed today or tomorrow. Owing to the low rate of Southern forge it is probable the Massillon interest will place its order for forge iron in the South and buy the foundry ore from the Northern furnace. A number of Pittsburg foundry interests are expected to place some large contracts for foundry iron within the next week, which may precipitate a general buying movement that will put prices to where they were several weeks ago. Steel-making pig iron is very scarce, and the small tonnage for the second quarter that remains unsold will be taken by the United States Steel Corporation. This will result likely in higher prices for second half, and it now seems certain that $17.50, Valley furnace, will be the minimum prices. The Republic Iron and Steel Company evidently anticipated higher prices last week, when it ordered 10,000 tons of bessemer iron for July delivery from the Bessemer Pig-Iron Association at $17.25 Valley, to be added to its recent order of 20,000 tons for June shipment. The Jones & Laughlin Steel Company also is providing for outside iron, and last week bought the entire output of the Sharpsville Furnace Company for the last half of the year. This company recently bought the old Sharpsville furnace, which has been idle for over three years, and is putting it in shape. The furnace will be blown in about July 1, and will have a capacity of about 150 tons a day, or a production of about 25,000 tons for the second half. The price agreed upon is said to be $17.25 at the furnace. Struthers furnace was blown out on Friday and several other furnaces in the Valleys may be forced to close for repairs shortly, which will have a decided effect on the bessemer pig-iron market.

The market in some lines of finished steel products is quiet, but the mills continue busy on old contracts, and despite the lull in new business the entire steel supply is being consumed. While bessemer billets are easier sheet-bars continue firm at $28, and owing to the scarcity the American Sheet and Tin Plate Company has been forced to close some of its tin-plate mills. Prices for third quarter, according to custom, will be announced by the Carnegie Steel Company on June 20, and it is intimated that an advance will be ordered. This may have the effect of reducing the number of independent customers and leave a better supply for the American Company. Buying of plates has slackened, but the mills are sold away ahead. Similar conditions exist in the structural material market. Steel-bar interests met here last week and re-affirmed prices of merchant steel bars at 1.50c., although some urged an advance, as iron bars are selling at from $1 to $2 a ton higher.

Arrangements were completed on Saturday for a conference on the wage scale between representatives of the Amalgamated Association of Iron, Steel and Tin Workers and the Western Bar Iron Association. It will be held in Detroit on Thursday. The association is composed of leading independent iron interests and was formed last February. A conference with the Republic Iron and Steel Company will be held early next month, according to the president of the Amalgamated Association, although it has been reported that this company proposes to break away from the workers' organization.

Pig Iron—With the closing of some contracts under negotiation sales of pig iron this week will aggregate close to 50,000 tons. Bessemer is strong at $17.25@17.50; basic, $17; foundry No. 2, $16.50, all at Valley furnaces; and gray forge at $16.50@16.60, Pittsburg.

Steel—The supply of bessemer billets has improved and $26 is quoted. Open-hearth billets are firm at $27; sheet and tin-plate bars at $28. Bars continue at 1.50c. and plates at 1.60c.

Sheets—An advance in prices is expected to be ordered at any time, as the demand is good and mills are behind in deliveries. Black sheets are firm at 2.40c. and galvanized at 3.45c. for No. 28 gage.

Ferro-Manganese—The market is easier and $75 is quoted for second-half delivery, while $85 is named for June shipment.

Cartagena, Spain. May 12.

Iron and Manganiferous Ores—Messrs. Barrington & Holt report that shipments for the week were one cargo, 2400 tons Colorado, and one cargo, 3850 tons manganiferous ore, to Great Britain; one cargo, 1850 tons manganiferous ore, to France. The local mineral market has been under the influence of considerable excitement, due to the rapid and steady fall in the rates of exchange. The rate of exchange has now fallen below 10 per cent., a position which would never have been credited a month or two back. Consequently miners and merchants are re-

luctant to sell for forward delivery, except on an exchange basis, which under the present circumstances can only safely be reckoned at par.

The export statistics of iron ore for the first three months of this year fully confirm the great activity in iron mining throughout Spain, the quantity exported being 2,500,000 tons, as against 1,659,000 tons duringthe same period of 1905, thus showing an increase of over 50 per cent.

Quotations are a shade higher, at 8s. 8d. @8s. 11d. for ordinary 50 per cent. ore; 9s. 2d.@9s. 5d. for special low phosphorus ore; 12s. 1d. for specular ore, 58 per cent.; 10s. 3d. for S. P. Campanil. Manganiferous ores range from 11s. 10d. for 35 per cent. iron and 12 manganese up to 18s. 3d. for 20 per cent. iron and 20 manganese. All prices are f.o.b. shipping port.

Pyrites—Iron pyrites, 40 per cent. iron and 43 sulphur, are quoted at 10s. 8d. per ton, f.o.b. shipping port.

Metal Market.

New York, May 30.

Gold and Silver Exports and Imports.

At all United States Ports in April and year.

Metal.	Exports.	Imports.	Excess.
Gold:			
Apr. 1906...	$2,485,552	$14,972,576	Imp. $12,487,024
" 1905 .	1,303,874	2,581 057	" 1,277,183
Year 1906..	22,632,174	25,288,663	" 2,656,489
" 1905..	35,319,138	11,803,259	Exp. 23,515,879
Silver:			
Apr. 1906...	4,213,687	2,796,626	Exp. 1,417,061
" 1905 ..	2,317,599	2,559,876	Imp. 242,277
Year 1906 ..	23,379,295	15 473,624	Exp. 7,905,671
" 1905 ..	14,930,041	8,075,232	" 6,854,809

These statements cover the total movement of gold and silver to and from the United States. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Movement, New York.

For week ending May 26, and years from Jan. 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week.....	$352,600	$2,318,579	$1,154,436	$ 50,141
1906.....	5,321,221	43,697,105	25,840,148	826,570
1905	32,990,546	5,131,462	12,844,738	1,515,140
1904.....	62,855,610	2,745,767	17,198,192	331,666

Imports of gold for the week were from London and Paris; of silver from Mexico and the West Indies. Exports of gold for the week were to Mexico; of silver, chiefly to London.

The statements of the New York banks—including all the banks represented in the clearing house—for the week ending May 26, gives the following totals, comparisons being made with the corresponding week of 1095:

	1905.	1906.
Loans and discounts..	$1,111,003,400	$1,049,390,880
Deposits.....	1,155,129,200	1,032,731,800
Circulation.....	45,935,700	49,834,900
Specie.....	214,622,800	180,981,000
Legal tenders.....	85,625,300	83,896,100
Total Reserve.....	$300,248,100	$264,877,100
Legal requirements....	288,782,300	258,182,950
Surplus reserve.....	$11,465,800	$6,694,150

Changes for the week this year were increases of $8,668,700 in loans, $2,500,200 in legal tenders and $5,898,900 in deposits; decreases of $4,660,600 in specie, $176,900 in circulation and $3,435,125 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world. The amounts are reduced to dollars:

	Gold.	Silver.	Total.
New York.....	.....	.....	$180,981,000
England.....	$166,801,745	.....	166,801,745
France.....	589,948,750	$212,851,755	802,800,505
Germany	190,325,000	63,445,000	253,770,000
Spain.....	75,645,000	121,340,000	196,985,000
Netherlands...	27,606,500	28,850,000	56,456,000
Belgium.....	16,476 665	8,238,335	24,715,000
Italy.....	142,835,000	19,699,000	162,534,000
Russia.....	442,610,000	27,960,000	470,570,000
Austria.	232,360,000	64,210,000	296,570,000

The returns of the associated banks of New York are of date, May 26, and the others May 25. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York. The New York banks do not separate gold and silver in their reports.

Shipments of silver from London to the East are reported by Messrs. Pixley & Abell as follows for the year to May 15:

	1905.	1906.	Changes.
India.....	£ 2,840.771	£ 6,762,203	I. £ 3,921,432
China.....	409 270	.....	D. 409,270
Straits..	2,800	1,750	D. 1,050
Total.....	£ 3,252,841	£ 6,763,933	I £ 3,511,112

Receipts for the week were £13,000 from the West Indies and £220,000 from New York: £233,000 in all. Exports were £120,300, all to India.

Indian exchange continues firm, money being in good demand in that country. All the Council bills offered in London were taken at an average of 16.03d. per rupee. Buying of silver for India continues on a good scale.

The silver market, on the present rise, culminated at 31⅜d.; Since then the rush of orders is over for the present and silver is quiet with moderate inquiry.

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars.....	$0.52½	$0.54½
Peruvian soles and Chilean.....	0.47½	0.50
Victoria sovereigns.....	4.85⅝	4.87½
Twenty francs.	3.86	3.89
Spanish 25 pesetas...	4.78	4 80

Other Metals.

Daily Prices of Metals in New York.

May	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
24	18⅝ @18⅞	18¾ @18⅞	85¼	42⅜	5.75	5.90 @5.95	5.75 @5.80
25	18⅝ @18⅞	18¾ @18⅞	85¼	41¼	5.75	5.95	5.80
26	18⅝ @18⅞	18¾ @18⅞	. . .	41⅛	5.75	5.95	5.80
28	18⅝ @18⅞	18¾ @18⅞	85	40¼	5.75	5.95 @6.00	5.80 @5.85
29	18⅝ @18⅞	18¾ @18⅞	85½	41	5.75	6.00	5.85
30	.....	.....	.....	.....	.....	.....	.....

London quotations are per long ton (2,240 lb) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars. The price of cathodes is usually 0.125c. below that of electrolytic. The lead prices are those quoted by the American Smelting & Refining Co. for near-by shipments of desilverized lead in 50-ton lots, or larger orders. The quotations in spelter are for ordinary western brands; special brands command a premium.

SILVER AND STERLING EXCHANGE.

May.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	May.	Sterling Exchange.	Silver. New York. Cents.	Silver. London, Pence.
24	4.85	67⅜	31 1/16	28	4.85¼	67⅝	31¼
25	4.85	67⅜	31 1/16	29	4.85¼	67⅜	31⅜
26	4.85¼	67½	31⅜	30	....	..	..

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, .925 fine.

Copper—Business has been rather dull. Consumers appear to be well covered for their immediate and future requirements. The market closes steady at 18⅝@18⅞ for lake; 18⅜@18⅝ for electrolytic is cakes, wirebars or ingots, and 18⅛@18½ for casting copper.

The standard market was a very uninteresting affair during the past week, the fluctuations being within narrow limits. The close is cabled as £85 16s. 3d. for spot and £85 2s. 6d. for three months prompt.

Refined and manufactured sorts are quoted: English tough, £88@£88 10s.; best selected, £88 10s.@£89 10s.; strong sheets, £98.

Copper Exports and Imports—The exports of copper from the United States for the four months ending April 30 are reported as follows by the Bureau of Statistics of the Department of Commerce and Labor; the figures given being in long tons of 2240 lb. each:

To:	1905.	1906.	Changes.
Great Britain..... ...	11,337	6,815	D. 4,522
Belgium	694	712	I. 18
France.....	11,382	12,267	I. 885
Italy	2,562	2,369	D. 193
Germany and Holland	30,438	34,609	I. 4,171
Russia	3,414	762	D. 2,652
Other Europe.....	3,687	3,896	I. 209
Canada.....	470	391	D. 79
China.....	15,878	800	D. 15,008
Other countries.....	4,039	45	D. 3,994
Total metal.....	83,901	62,666	D. 21,235
In ore and matte.....	1,926	2,528	I. 602
Total.....	85,827	65,194	D. 20,633

The decrease in the total is 24.1 per cent. The actual quantities of ore and matte were 10,437 tons in 1905, and 18,521 tons in 1906; contents are estimated chiefly on the basis of values.

Imports of copper and copper material for the four months are reported as follows; the figures giving the contents of all material in long tons of fine copper:

	Metal.	In ore,etc.	Total.
Mexico.....	13,158	5,395	18,553
Canada.....	5,534	1,257	6,791
Great Britain.....	2,977	.....	2,977
Other countries.....	3,229	1,323	4,552
Total imports..... . .	24,898	7,975	32,873
Re-exports.....	68	....	68
Net imports.....	24,830	7,975	32,805
Net imports, 1905.....	22,136	6,505	28,641

The total increase this year was 4164 tons, or 14.5 per cent. The actual tonnage of ores and matte from Mexico this year was 43,529; from Canada and Newfoundland, 11,345 tons.

The exports exceeded the net imports by 57,186 tons in 1905, and 32,389 tons in 1906; a decrease of 24,797 tons this year.

Tin—The market has settled down and shows a steadier tone. Business is of a hand-to-mouth character, and the quotations at the close are 41@41.25c.

The close of the London market is cabled as £186 10s. for both spot and three months prompt.

Imports of tin into the United States for the four months ending April 30 are reported as below, in long tons, of 2240 pounds each:

	1905.	1906.	Changes.
Straits	8,759	6,056	D. 2,674
Australia	112	366	I. 254
Great Britain	6,025	8,278	I. 2,253
Holland	149	152	I. 3
Other Europe	320	586	I. 266
Other countries	18	23	I. 5
Total	15,354	15,461	I. 107

There was a light increase this year, only 0.7 per cent.

Lead—Business is somewhat quieter, but prices remain unchanged.

The London market is steady and the close is cabled as £16 15s. for Spanish, and £16 17s. 6d. for English lead.

Imports of lead into the United States for the four months ending April 30, with re-exports of foreign metal, are reported as follows, in short tons, of 2000 lb. each:

	1905.	1906.	Changes.
Lead, metallic	2,308	3,161	I. 853
Lead in ores and base bullion	37,762	26,434	D. 11,328
Total imports	40,070	29,595	D. 10,475
Re-exports	20,946	16,956	D. 3,990
Net imports	19,124	12,639	D. 6,485

Of the lead imported this year 25,890 tons were from Mexico and 1537 tons from Canada. There were 2108 tons imported from Europe, an unusual movement. Exports of domestic lead were 70 tons in 1905, and 195 tons in 1906.

Spanish Lead Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of May 12, that silver has been 13.75 reales per ounce. Exchange is 28.20 pesetas to £1. Pig lead has been 77 reales per quintal; equal, on current exchange to £15 5s. 10d. per long ton, f.o.b. Cartagena. Exports were 700 tons desilverized lead to London and 300 tons to Amsterdam; 288 tons argentiferous to Marseilles.

Spelter—After the long dull spell the market at last shows some life. The London quotations have moved up to near the domestic parity, and as a result a heavy inquiry was forthcoming for export. This has considerably stiffened sellers and has brought in a good inquiry, both speculative and consumptive. The closing quotations are firm at 6 cents New York, and 5.85c. St. Louis.

The London market at the close is higher, the quotations cabled being £27 10s. for good ordinaries, and £27 12s. 6d. for specials.

Exports of spelter from the United States for the four mounths ending April 30 were 1271 short tons in 1905, and 1703 tons in 1906; an increase of 432 tons. Exports of zinc ore were 7678 tons in 1905, and 10,272 tons in 1906; an increase of 2594 tons. Exports of zinc dross were 4099 short tons in 1906; this article was not reported separately last year. In the month of April 1153 tons of spelter were imported, an unusual movement.

Spanish Zinc Ore Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of May 12, that the market shows no change. Export of zinc ores for the week were 2400 tons to Stettin and 1900 tons to Antwerp.

Zinc Sheets—The price of zinc sheets is $7.65 per 100 lb. (less discount of 8 per cent.) f.o.b. cars for Lasalle and Peru, in 600-lb. cases for gages No. 9 to 22, both inclusive; widths from 32 to 60 in., both inclusive, and lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 lb. The fluctuations in the base price for sheet zinc since Jan. 1, 1906, have been as follows: Jan. 6, 1906, $8; Feb. 5, $7.75; May 18, $7.65.

Antimony is very firm, Hallett having put up his price to £140 for delivery during June, July and August.

Imports of antimony into the United States for the four months ending April 30 were as follows, in pounds:

	1905.	1906.	Changes.
Metal and regulus	1,258,939	2,658,999	I. 1,400,069
Antimony ore	1,022,492	538,985	D. 483,507

This shows a decrease of 47.3 per cent. in ore, but an increase of 111.8 per cent. in metal and regulus.

Nickel—Quotations for large lots, New York, or other parallel delivery, are 40@47c. per lb., according to size and condition of order. For small quantities, prices range from 48c. up to 60c., also according to size of order and deliveries.

Imports of nickel ore and matte into the United States for the four months ending April 30 were 4322 tons in 1905, and 4246 tons in 1906; a decrease of 76 tons. Exports of nickel, nickel oxide and nickel matte were 4,255,963 lb. in 1905, and 4,116,285 lb. in 1900; a decrease of 139,678 lb. this year.

Platinum—Prices are strong, the demand being good, while supplies are uncertain, and barely sufficient to meet requirements. Current price in New York is $25 per ounce.

Imports of platinum into the United States for the four months ending April 30 were 2605 lb. in 1905, and 3984 lb. in 1906; an increase of 1379 lb. this year.

Quicksilver—The metal is firm and New York prices are still $41 per flask of 75 lb. for lots of 100 flasks or over, and $42 for small lots down to 10 flasks. For retail quantities, under 10 flasks, pound prices are charged, which work out to $43.50@44 per flask. San Francisco prices are firm at $39.50 for domestic orders and $38 for export. The London price is weaker, at £7 5s., with £7 3s. 9 d. quoted by jobbers.

Exports of quicksilver from the United States for the four months ending April 30 were 454,305 lb. in 1905, and 233,641 lb. in 1906; a decrease of 220,664 lb. this year.

Aluminum—List prices of the chief maker are as follows, for ingots: No. 1, over 99 per cent. pure, 38c. per lb. in less than 100-lb. lots, 36c. in lots of 100 lb. up to one ton, and 35c. in ton lots; No. 2, over 90 per cent., 35c., 43c. and 33c., as above. Granulated metal is 1c. per lb. over price of ingots. Rolled sheets from 44c. up, according to size.

Exports of aluminum from the United States for the four months ending April 30 were valued at $54,417 in 1905, and $39,210 in 1906; a decrease of $15,207 this year.

Wisconsin Ore Market.

PLATTEVILLE, May 26.

The market conditions were about the same as last week, zinc still holding above $40 for high-grade ore. Buying was only in small lots; little disposition was shown to purchase any except that which could be loaded easily. An effort was made to get loaded all that had been purchased. Gritty Six ore brought top price for roasted material, averaging 60 per cent. and less than 2 per cent. iron in the finished heads.

There was practically no competition, and no outside buyers represented. Operations at some of the plants were a little curtailed, owing to lack of coal and want of competent labor.

There was no new development in lead buying, the price being the same as last week, except in one special case where $38.25 per thousand was paid.

Drybone and sulphur prices remained unchanged.

The camps of the Platteville district loaded ore as follows during the week.

Camps.	Zinc, Lb.	Lead, Lb.	Sulphur, Lb.
Platteville	201,110	.....	.....
Cuba City	266,490	.....	.....
Linden	246,530	.....	62,660
Highland	185,750	66,300	.....
Buncombe-Hazel Green	120,500	.....	.....
Shullsburg	120,000	.....	.....
Livingston	83,500	.....	.....
Rewey	61,100	.....	.....
Montfort	.....	.....	124,600
Total for week	1,284,920	66,300	187,260
Year to May 26.	25,929,135	1,405,760	2,689,800

Several new propositions are just about starting and as usual there is an exodus of men from the old to the new. It is

hoped that these conditions will soon be changed by imported labor; several gangs of miners are expected from the copper regions in the north.

Missouri Ore Market.

JOPLIN, May 26.

The demand for zinc ore during the past week was exceptionally strong, and rumors were current that a base price of $42 per ton of 60 per cent. zinc was paid, but these rumors could not be verified. The highest known price was $44, on an assay basis of $41, while the bulk of the ore sold on a $40 basis. The average price of zinc was $39.82.

Lead slumped $1 per ton for the better grades, the highest reported paid being $82, but medium grades were as high, and in a few cases higher than last week. The average price of lead was $40.20.

For the five months ending with May the district has produced and marketed 11,051 tons of zinc and 3,050 tons of lead more than during the same five months of last year, and the value is $711,715 greater. The production is nearly 2000 tons per month heavier than last year, indicating a probable increase of 24,000 for the year. May this year shows an increase in shipment of over 6,000 tons compared with May of last year.

Following are the shipments of zinc and lead for the various camps of the Joplin district for the week ending May 26:

	Zinc, lb.	Lead, lb.	Value.
Carterville-Webb City	2,840,880	604,260	$82,940
Joplin	2,526,610	225,170	62,065
Galena-Empire	1,177,650	221,550	31,240
Duenweg	806,470	227,260	25,622
Aurora	1,074,630	.....	18,766
Badger	699,690	.....	14,690
Oronogo	503,340	17,900	11,053
Alba	426,630	34,130	10,537
Granby	450,000	45,000	9,350
Prosperity	261,120	66,500	8,012
Neck City	359,560	.....	7,730
Stott City	215,510	.....	4,417
Spurgeon	176,940	39,510	3,660
Carthage	189,970	.....	3,320
Cave Springs	74,510	1,480	1,555
Zincite	44,650	.....	955
Totals	11,838,060	1,482,760	$295,912

Five months..... 219,913,660 30,352,010 $5,904,015
Zinc value, the week, $236,242; 5 months, $4,760,879.
Lead value, the week, 59,670; 5 months, 1,144,036.

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months; the average for zinc being based on the prices of assay basis ores carrying 60 per cent. zinc.

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1905.	1906.	Month.	1905.	1906.
January	52.00	47.38	January	61.50	75.20
February	53.77	47.37	February	57.62	72.83
March	47.40	42.68	March	57.20	73.73
April	42.88	44.63	April	58.00	75.13
May	43.31	....	May	58 27	....
June	40.75	....	June	57.80	....
July	43.00	....	July	58.00	..
August	48.83	....	August	58.00	....
September	46.75	....	September	63.50	....
October	47.60	....	October	63.86	....
November	49.55	....	November	68.67	....
December	49.00	....	December	76.25	....

Mining Stocks.

NEW YORK, May 30.

The market has shown little or no change of any importance since last week. Trading has continued to be dull, with small and rather meaningless fluctuations. Upon the whole, it is hard to say whether stocks have gained or lost. Mining stocks have been rather neglected, and there is no news to give.

A small concern known as the Wall Street Stock and Mining Exchange has been in existence for some time, but has attracted little attention. It has dealt chiefly in Tonopah stocks. On May 24, the board of governors of the New York Stock Exchange issued the following notice: "Any member of the Exchange who is connected either directly or by partner or clerk, or otherwise, with the Wall Street Mining and Stock Exchange, or who has any connection, direct or indirect, by means of telephone, ticker, telegraph wire, or any electrical or other contrivance or device, or pneumatic tube, or other apparatus, with said Exchange, or with the office of any member of said Exchange, is guilty of an act, or acts, detrimental to the interest and welfare of this Exchange, and any such connection is hereby prohibited."

The action taken by the Stock Exchange is in line with its well-known policy of prohibiting its members from having any business connection with an outside body.

Boston. May 28.

The market for mining shares the last week has been one of inertia for the bulk of the list. There has been activity in spots, but price changes have been unimportant outside of one or two stocks. The North Butte Company increased its dividend to $2 quarterly, but this had been discounted. The stock varied from $91.25 to $94, closing a fraction below a week ago at $92.87½. Atlantic Mining had another break today, touching $10.75 on receipt of news that the mine had had another disturbance which will likely preclude any possibility of further mining this year. Greene Consolidated tumbled to $25.87½ today on heavy selling for New York account. It was accompanied by reports of another increase in the stock and that the dividend might be reduced, but there was nothing to confirm these reports. The close was $2 below a week ago, at $26.

Franklin is being talked of favorably and the stock has advanced $1.12½ to $18.75. One-half per cent. is bid to call any part of 1000 shares in 100-share lots at $25 the balance of the year. Mohawk was bought up to $66.50, which is $1 above a week back. Old Dominion on a narrow market broke $1.50 to $40, but easily recovered to $42. Parrot records a $1.50 advance to $28.50 and Utah $2.50 to $63.50. Calumet & Arizona is $4.50 to $116.50, upon the increase in the dividend from $2.50 to $3. No important changes have occurred on the local curb, except that Balkalala spurted $1 to $15.50, with subsequent reaction. Arizona Commercial touched $40.25 and holds well. Keweenaw also advanced $2 to $13. J. A. Coram's American Copper Company's seems to be about ready again for flotation, that is the Butte unit.

Colorado Springs. May 25.

The market in Cripple Creek shares has been rather spotty during the past seven days, but on the average but fairly active. Several noticeable fluctuations were recorded. The most important news of the week was the decision of the exchange to list Colorado industrial stocks, and the brokers feel quite enthusiastic, believing that it will practically double the value of the exchange. Colorado Fuel and Iron, Colorado Telephone, American Smelting and Refining, and many other well-known stocks, besides numerous smaller ones, will be dealt in on the exchange.

Elkton has been quite an active trader, but registered a decline of 2c., selling today down to 45c. El Paso also took a similar tumble, closing today at 45½c. Findley remained practically stationary during the week, selling around 76c. Isabella still remains around 24¼c. Golden Cycle sold today for 83c. Portland took a sensational slide, dropping on today's call from $1.80 to $1.50 with no apparent reason. The mine is reported to be in the pink of condition, and the company is about to begin work on a $75,000 cyanide addition to the mill. Outside manipulation is supposed to be responsible.

San Francisco. May 24.

The San Francisco Stock Exchange will open May 28 in temporary quarters near the former building on Pine street, and within a few weeks thereafter a permanent structure will be erected on the site of the old theater on Bush street, above Montgomery. Plans for the new building have already been drawn by William Curlett, the architect. They are for a $200,000 brick structure, with a frontage of 70 ft. on Bush street, and make provision for a 60x70-ft. board-room in the rear of the first floor, together with 27 large offices. The building is to be 137 ft. in depth and will be constructed of brick. The walls of the building which occupied the lot previous to the fire are almost intact, the front wall being as good as ever, and will be used as part of the new exchange. The lot has been leased from the Shields estate. Few records were lost in the burning of the old stock exchange at 331 Pine street, as all of the 84 members of the association had safe deposit boxes. At present no stock business is done in the city, though one company is operating a direct-wire connection with the stock

exchange in New York, and quotations are being received in Oakland.

A new mill is being erected on the Brooklyn mine at Vrginia Dale by Frank Cram and John Coy. The small plant now in operation yielded 100 oz. of gold in its last 15 days' run.

Del Monte Mining Company—The directors have voted to increase the capital stock from $100,000 to $300,000 and at a special meeting to be held July 9 the stockholders will decide on the proposition.

Dividends.

Company.	Payable.	Rate.	Amt.
Calumet & Arizona	June 20	$3.00	$ 600,500
Calumet & Hecla	June 22	15.00	1,500,000
Con. Mercur	June 25	0 02½	25,000
Federal Mg. & Sm.	June 15	4.00	240.000
Federal Mg. & Sm., pfd	June 15	1.75	200,000
General Chemical, pfd	July 2	1.50	150,000
National Lead	July 2	1.00	149,054
New Century	June 1	0.01	15,000
North Butte	June 21	2.00	200,000
Old Dominion	June 15	0 50	144,000
Parrot, Mont	June 12	0.25	57,463
Republic Iron & St., pfd	July 2	3.75	765,634
Tonopah Belmont	June 15	0.10	100,000
U. S. Red. & Ref. pfd	July 1	3.75	59,187

Assessments.

Company.	Delinq.	Sale.	Amt.
Alameda, Idaho	June 11	July 9	$0.04
Butler—Liberal, Utah	May 26	June 16	0.02
Congar, Utah	May 29	June 10	0.0½
Justice	May 17	June 12	0.05
Lower Mammoth, Utah	June 16	July 31	0.05
Overman	May 18	June 8	0.10
Tetro, Utah	June 7	July 2	0.02
Utah & Montana, Utah	June 4	June 4	0.00½

Tonopah Stocks

May 29.

(Revised by Weir Bros. & Co., New York.)

	Bid.	Asked.
Tonopah Mine of Nevada	19.00	19.87½
Tonopah Montana	2.97	3.00
Tonopah Extension	10.25	10.50
Tonopah Midway	2.40	2.50
Tonopah West End	2.62	3.12½
Goldfield Mining Co.	.48	.50
Jumbo Mining	1.45	1.55
Red Top	1.65	1.70
Sandstorm	....	.80
Montgomery Shoshone Cons	15.75	16.12½
Eclipse-Bullfrog	.98	1.02
Denver-Bullfrog	1.67	1.75

St. Louis.

May 26.

Adams, $0.40—$0.25; American Nettie, $0.15—$0.10; Center Creek, $2.20—$2.00; Central Coal and Coke, $62 00—$61.00; Central Coal and Coke, pfd., $80.00—$70.00; Central Oil, $60.00—$58 00; Columbia, $5.00—$1.00; Con. Coal, $30.00—$21 50; Doe Run (old stock), $325.00 - $300.00; Granite Bimetalic, $0.25—$0.20; St. Joe (old stock), $32.00—$31.00.

LONDON. (*By Cable.**)

May 29.

Dolores, £1 16s. 3d.; Stratton's Independence, £0 4s. 0d.; Camp Bird, £1 2s. 9d.; Esperanza, £3 18s. 9d.; Tomboy, £1 7s. 6d.; El Oro, £1 8s. 9d.; Oroville, £0 17s. 6d.; Arizona Copper, pf., £3 15s. 0d.; Arizona Copper, def., £3 14s. 0d.

PHILADELPHIA.

Cambria Steel	35	34¾	34⅞	1,057
Philadelphia Co	51	50⅜	50⅞	401
Tonopah	20	19⅜	19½	1,240

PITTSBURG.

Crucible Steel	13¾	13	13	1,428
Crucible Steel, Pd	80	79⅞	79⅞	609
Tonopah Ext	10¾	10½	10⅝	380

STOCK QUOTATIONS.

NEW YORK. Week May 29

Name of Company.	High	Low	Clg.	Sales
Amalgamated	109⅜	106¼	108½	349,680
Anaconda	271	264	266¾	150,400
Boston Copper	26¼	24½	25⅛	4,030
British Col. Copper	8	7⅛	7⅛	3,750
Federal	169¾	169¾	169¾	100
Federal, Pf.	99¾	98⅞	99⅝	2,200
Greene Copper	28⅛	25⅜	26	13,914
Greene Gold	4	3¾	3⅞	2,300
Mitchell	8	7⅛	7⅞	2,625
Tennessee Copper	45	44	44⅝	1,000
Union Copper	1⅛	1⅛	1⅛	15,050
United Copper,	66¾	63⅝	63¾	18,300
Utah Apex	6⅝	6⅜	6⅝	3,500
Utah Copper	27¼	25¾	25⅞	3,500

NEW YORK INDUSTRIALS.

Am. Smelting & Ref.	155½	152⅛	153⅞	79,700
Am. Smelting & Ref., Pf.	119¾	118	119	1,000
Col. Fuel & Iron	55¾	49½	54¾	93,970
Pittsburg Coal	14⅛	14¼	14⅛	200
" " pfd	57	54		
National Lead	77¾	76	76½	9,850
Republic I. & S.	28½	27¼	28	2,600
Republic I. & S., Pf	103¾	102	103½	4,770
Tenn. C. & I	152⅜	147	151⅜	17,900
U. S. Red. & Ref.	38¾	36½	36¾	5,200
U. S. Red. & Ref., Pf.	80	77	78¾	5,700
U. S. Steel	41¾	39¾	40⅞	170,700
U. S. Steel, Pf.	106½	104¾	105⅜	21,600
Standard Oil*	619½	614	615	96
Bethlehem Steel	29¾	27	28½	3,960

These stocks, not elsewhere quoted, had the following range of prices during the week: (New York) Atlanta, .20—.19; Bamb. Delamar, 5¼—4¾; Best & Belcher, 1.05; Comstock, .25—.17; Con. Cal. & Va., 1.15; Guanajuata, 5¾—5¾; Little Bell, 14—13; Micmac, 4¾—4¼; St'd Oil, 619½—614. (Boston) Ahmeek, 80—70; Ariz. Com'l, 39¼—36; Cal. & Pitts., 30—26½; East Butte, 10¾—10; Keweenan, 12½—11; Lake S. & Pitts., 30—26; Pitts. & Del., 19—17½; Black Mt., 10—9¾; Butte & Lon., 2½—2¼; Majestic, 1¾; Raven, 4—3¾; Shawmut, 1⅝—1¼; Superior Cop. 16—15; Troy, 2¼—2.

BOSTON.

Allouez	39¼	38⅛	39	580
Amalgamated	111⅜	108	108¼	23,757
Atlantic	14	10⅝	11⅛	7,404
Bingham	35	34⅜	34⅜	1,015
Boston Consolidated	26¼	24¼	25⅛	4,030
*Calumet & Hecla	705	*680	*680	144
Centennial	24	23	23	505
Copper Range	77	75⅛	77	2,551
Daly-West	16⅞	15	16⅜	1,475
Franklin	18⅜	17⅛	17⅛	1,844
Granby	13	12¾	12¾	310
Green Con. Copper	28⅛	25⅛	26	13,914
Isle Royale	21	20	20¼	320
Mass	8	8	8	70
Michigan	12¼	12½	12½	100
Mohawk	66⅜	65	66⅛	2,389
North Butte	94	91¼	93	7 411
Old Dominion	42	40	41½	2,135
Osceola	111	109	110	1,524
Parrot	28⅛	27	28	2,712
Quincy	100	100	100	72
Rhode Island	6	5	5⅜	1,240
Shannon	9½	8¾	9¼	3,704
Tamarack	101	101	101	35
Tecumseh	11⅛	10¾	11¼	282
United Copper, com	65½	62½	63¾	6,935
U. S. Smg. & Ref.	59½	57⅞	58½	2,638
" " pfd	46¼	45⅞	46⅛	3,598
Utah Con	63⅛	61	62¾	6,638
Victoria	7⅝	7	7⅛	817
‡Winona	7	6	7	201

COLORADO SPRINGS.

Name of Company.	First	High	Low	Clg
Elkton	44¾	48½	43	48
El Paso	51	51	49⅞	49⅞
Isabella	25	26	24½	24½
Portland	195	195	180	180
Vindicator	95	95	93	93

SAN FRANCISCO.

(Business suspended for the present; last figures left for reference.)

Best & Belcher	1.25	1.25	1.15	1.15
Bullion	.31	.31	.25	.29
Caledonia	.37	.44	.35	.44
Confidence	.90	.94	.90	.90
Con. Cal. & Va	1.35	1.35	1.30	1.30
Gould & Curry	.28	.28	.27	.27
Hale & Norcross	1.20	1.20	1.05	1.10
Mexican	1.15	1.15	1.15	1.15
Occidental Con	.96	.96	85	.95
Ophir	5.37½	5.50	5 25	5.25
Savage	1.00	1.00	1.00	1.00

*Ex-dividend. †1st Installment Paid.
‡Assessment Paid. §2d Installment Paid.

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London.	
	1905.	1906.	1905.	1906.
January	60.690	65.288	27.930	30.113
February	61.023	66.108	28.047	30.464
March	58.046	64.597	26.794	29.854
April	56.600	64.765	26.108	29.984
May	57.832	.....	26.664	.....
June	58.428	.....	26.910	.....
July	58.915	.....	27.163	.....
August	60.259	.....	27.822	.....
September	61.695	.....	28.528	.....
October	62.034	.....	28.637	.....
November	63.849	.....	29.493	.....
December	64.850	.....	29.977	.....
Year	60.352	.....	27.839	.....

The New York prices are in cents per fine ounce; the London quotation is in pence per standard ounce, .925 fine.

COPPER.

	NEW YORK.				LONDON.	
	Electrolytic.		Lake.			
	1905.	1906.	1905.	1906.	1905.	1906.
Jan.	15.008	18.310	15.128	18.416	68.262	78.896
Feb.	15.011	17.869	15.136	18.116	67.963	78.147
March.	15.125	18.361	15.250	18.641	68.174	81.111
April.	14.920	18.375	15.045	18.688	67.017	84.793
May	14.627	.....	14.820	.....	64.875	.....
June	14.673	.....	14.813	.....	65.881	.....
July	14.888	.....	15.006	.....	66.887	.....
Aug.	15.664	.....	15.725	.....	69.830	.....
Sept.	15.965	.....	15.978	.....	69.667	.....
Oct.	16.279	.....	16.332	.....	71.406	.....
Nov.	16.599	.....	16.758	.....	74.727	.....
Dec.	18.328	.....	18.398	.....	78.993	.....
Year.	15.590	.....	15.699	.....	69.465	.....

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan	29.325	36.390	July	31.760	.....
Feb	29.262	36.403	August	32.866	.....
March	29.523	36.662	Sept	32.095	.....
April	30.525	38.900	Oct	32.481	.....
May	30.049	.....	Nov	33.443	.....
June	30.329	.....	Dec	35.835	.....
			Av. year.	31.358	.....

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan	4.552	5.600	July	4.524	.....
Feb	4.450	5.464	Aug	4.665	.....
March	4 470	5.350	Sept	4.850	.....
April	4.500	5.404	Oct	4.850	.....
May	4.500	.....	Nov	5.200	.....
June	4.500	.....	Dec	5.422	.....
			Av., year.	4.707	.....

Prices are in cents per pound. The London average for January, 1906, was £ 16.850 per long ton; February, £ 16.031; March, £ 15.922; April, £ 15.859.

SPELTER.

Month.	New York.		St. Louis.		London.	
	1905.	1906.	1905.	1906.	1905.	1906.
Jan.	6.190	6.487	6.032	6.337	25.062	28.225
Feb.	6.139	6.075	5.989	5.924	24.594	25.844
Mar.	6.067	6.209	5.917	6.056	23.825	24.563
April.	5.817	6.078	5.667	5.931	23.813	25.781
May.	5.434	.....	5.284	.....	23.594	.....
June.	5.190	.....	5.040	.....	23.875	.....
July	5.396	.....	5.247	.....	23.938	.....
Aug.	5.706	.....	5.556	.....	24.675	.....
Sept.	5.887	.....	5.737	.....	26.375	.....
Oct.	6.087	.....	5.934	.....	28.225	.....
Nov.	6.145	.....	5.984	.....	28.500	.....
Dec.	6.522	.....	6.374	.....	28.719	.....
Year.	5.882	.....	5.730	.....	25.433	.....

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2,240 lb.) good ordinary brands.

DIVIDENDS.

Metal and Mining Companies—U. S.

Name of Company and Location.		Authorized Capital	Shares. Issued.	Par Val.	Dividends. Total to Date.	Latest. Date.	Amt.
Alaska Mexican, g.	Al'ka	$1,000,000	180,000	$ 5	$1,374,381	Feb. 1906	$ .30
Alaska Treadwell,g.	Al'ka	5,000,000	200,000	25	8.535,000	Feb. 1906	1.00
Alaska United, g.	Al'ka	1,000,000	180,200	5	.....	Feb. 1906	0.40
Amalgamated, c.	Mont	155,000,000	1,530,879	100	38,720,486	May 1906	1.75
Am.Sm.&Ref.,com.	U. S.	50,000,000	500,000	100	6,750,000	Apr. 1906	1.75
Am. Sm. & Ref. pf.	U. S.	50,000,000	500,000	100	20,891,553	Apr. 1906	1.75
Am. Smelters, pf. A	U. S.	17,000,000	170,000	100	765,000	Mar. 1906	1.50
Am. Smelters. pf. B	U. S.	30,000,000	300,000	100	1,125,000	Mar. 1906	1.25
Anaconda,c.	Mont	30,000,000	1,200,000	25	28,200,000	Apr. 1906	1.12½
Annie Laurie, g.	Utah	5,000,000	25,000	100	465,061	July 1905	.50
Arizona, c.	Ariz	3,775,000	3,682,520	.....	6,182,361	Apr. 1906	.05
Atlantic, c.	Mich	2,500,000	100,000	25	990,000	Feb. 1905	.02
B. & H., l. z.	Mo	400,000	400,000	1	40,000	Dec. 1905	.01
Boston & Montana.	Mont	3 750,000	150,000	25	45,275,000	Apr. 1906	3.00
Bunker Hill & Sull.	Ida	3,000,000	300 000	10	6,246,000	Apr. 1906	.60
Butte & Boston, c.	Mont	2 500,000	200,000	25	1,800,000	Feb. 1904	1.00
Calumet & Arizonac	Ariz	2,500,000	200,000	10	4,500,000	June 1906	3.00
Calumet & Hecla,c.	Mich	2,500,000	100,000	25	94,350,000	May 1906	15.00
Camp Bird, g., s.	Colo	5,500,000	820,000	5	3,382,500	Feb. 1906	.24
Central Eureka, g.	Cal.	400,000	398,425	1	778,921	Mar. 1906	.07
C. K. & N., g	Colo.	1 500,000	1,431,900	1	229,104	Dec. 1904	.01
Con. Mercur, g.	Utah	1,000,000	1,000,000	1	1,130,000	Mar. 1906	.02½
Continental, z. l.	Mo.	550,000	22,000	25	154.000	Apr. 1906	.50
Copper Range	Mich	2,500,000	100,000	25	150,000	Oct. 1905	1.50
Copper Range Con.	Mich	38,500,000	383,781	100	1,968,374	Mar. 1905	1.25
Creede United, g.	Colo.	1,625,000	1,625,000	1	173,428	July 1905	.02
Cripple Creek Con g	Colo.	2,000,000	2,000,000	1	180,000	Mar. 1905	.00½
Daly West, g. s. l.	Utah	3,600,000	180,000	20	5,607,000	May 1906	.60
De Lamar, g. s	Ida	400,000	67,180	5	2,926,370	May 1905	.72
Dillon, g.	Colo.	1,250,000	1,250,000	1	21,875	July 1905	.01
Doe Run, l.	Mo.	1,500,000	15,000	100	752,072	Apr. 1905	1.50
Elkton Con., g.	Colo.	3,000,000	2,500,000	1	1,504,561	Mar. 1906	.00½
El Paso, g.	Colo.	2,500,000	2,450,000	1	973,250	Mar. 1906	.01
Fed. Sm., com.	Idaho	10 000,000	60,000	100	1,208,750	May 1906	4.00
Federal Sm., pf.	Idaho	20,000,000	120,000	100	2,021,250	May 1906	1.75
Findley, g.	Colo.	1,250,000	1,250,000	1	275,000	Apr. 1906	.01
Gemini-Keystone	Utah	500,000	5 000	100	1,800,000	Apr. 1906	10.00
Gold King Con	Colo.	5 750,370	5,750,370	1	1,407,504	May 1905	.01
Gold Sovereign	Colo.	2,000,000	2,000,000	1	10,000	Jan. 1905	.00½
Grand Central, g.	Utah	250,000	250,000	1	1,086,250	May 1906	.06
Gwin Mine, Dev., g.	Cal	1,000,000	100,000	10	35,000	Mar. 1906	.25
Hecla, s. l.	Idaho	250,000	1,000,000	0.25	620,000	Apr. 1906	.02
Homestake, g.	S. D.	21,840,000	218,400	100	14,551,750	Apr. 1906	.50
HornSilver,g.s.c.z.l	Utah	10,000 000	400,000	25	5,482,000	Mar. 1906	.05
Inter'l Nickel,l pf.	N. Y.	12,000,000	$ 87,415	100	133,689	Feb. 1906	1.50
Iron Silver	Colo.	10,000,000	500,000	20	3,600,000	Apr. 1906	.20
Jamison, g.	Cal	3,900 000	390,000	10	213,800	Jan. 1906	.03
Jerry Johnson.	Cal	2,500,000	2,500,000	1	61,700	Apr. 1906	.03
Kendall, g.	Mont	2,500,000	500 000	5	815,000	Apr. 1906	.03
Liberty Bell,g. s.	Colo.	700,000	130,551	5	110,857	Jan. 1906	.15
Lightner, g.	Cal	125,000	102,255	1	295,694	Aug. 1905	.05
Lucky Budge, z.	Mo.	40,000	400	100	46,800	Apr. 1905	12.00
Lyon, z. l	Mo.	50,000	4,585	10	2 117	Jan. 1905	.20
Mammoth, g. s. l.	Utah	10,000 000	400,000	25	2,000 000	Apr. 1906	.05
Mary McKinney, g.	Colo.	1,000,000	1,000,000	1	606,000	Apr. 1906	.03
Mohawk, c.	Mich	2.500,000	100,000	25	200,000	Jan 1906	2.00
Mont. Ore Purch.	Mont	2,500,000	81,000	25	4,914 000	Mar. 1906	10.00
Monument, g.	Colo.	300,000	300,000	1	27,124	Apr. 1905	.01
Nevada Keystone, g	Nevada	1,000,000	638,877	1	61,790	Feb. 1904	.03
New Century, z., l.	Mo.	150,000	150,000	1	24,000	May 1906	.01
New Idria, q	Cal	500 000	100,000	5	820,000	Apr. 1906	.20
New Jersey, z.	U. S.	10,000,000	100,000	100	8,400,000	Feb. 1906	3.00
North Butte.	Mont	6,000,000	400,000	15	1,800,000	May 1906	2.00
North Star, g.	Cal	2,500,000	250,000	10	1,086,989	May 1906	.20
Northern Light,g.s.	Utah	2,000,000	400,000	5	20,000	Feb. 1904	.05
Old Dominion Cop.	Ariz.	7,500,000	288,000	25	144,000	Dec. 1905	.50
Old Gold	Colo.	2,101,150	2,101,150	1	10,506	Mar. 1906	.05
Ophir, g. s	Nevada	302,400	100,800	3	1,797,400	July 1904	.25
Osceola, c.	Mich	2,500,000	96,150	25	5,221,200	Jan. 1906	4.00
Parrot, c,s.	Mont	2,300,000	229,850	10	6,520,337	May 1906	.25
Peacock Valley, l. z.	Mo.	25,000	2,500	10	47,500	May 1905	.....
Pennsylvania, g.	Cal	5,150,000	51,500	100	284,925	July 1905	.10
Penn-Wyoming	Wyo.	10,000,000	10,000,000	1	50,000	July 1905	.01½
Platteville, l. z	Wis.	20,000	500	40	89,500	Oct. 1905	10.00
Portland, g.	Colo.	3,000,000	3,000,000	1	7,117,086	Apr. 1906	.05
Quicksilver, pf.	Cal	4,500,000	43,000	100	1,931,411	May 1903	.50
Quilp, g	Wash	1,500,000	1,500,000	1	15,000	Apr. 1904	.01
Quincy, c	Mich	2,500,000	100,000	25	15,720,000	Feb. 1906	5.00
Red Bird, g. s. c. l.	Mont	1,500,000	300,000	5	72,000	Dec. 1904	.01
Rob Roy, z.	Mo.	15,000	15,000	1	8,700	Jan. 1906	.03
Rocco Homest'k,l.s.	Nevada	300,000	300,000	1	112,000	Dec. 1905	.02
Sacramento, g, q.	Utah	5,000,000	1,000,000	1	235,000	Apr. 1906	.00½
Salvator, g. s. l.	Utah	200 000	200,000	1	6,500	Aug. 1904	.01
St. Joseph, l.	Mo.	6,000,000	375 000	10	4,508,357	Mar. 1906	.01½
Silver Hill, g. s	Nevada	108,000	108 000	1	59,400	Feb. 1906	.05
Silver King, g. s. l.	Utah	3,000,000	150,000	20	10,225,000	May 1906	.33½
South Swansea, g.s.	Utah	300,000	300,000	1	170 500	Apr. 1904	.01
Spearfish, g.	S. D.	1,500,000	1,500,000	1	165,500	Jan. 1905	.01½
Standard Con., g. s.	Cal	200,000	178,394	10	4,178,174	Feb. 1906	.10
Stratton'sIndepend	Colo.	5,500,000	1,000,007	5	4 895,865	Apr. 1906	.12½
Tamarack, c	Mich	1,500,000	60,000	5	9,000,000	Jan. 1906	3.00
Tennessee, c.	Tenn	5,000,000	175,000	25	437,500	Jan. 1904	1.25
Tomboy, g. s	Colo.	1,500,000	300,000	25	1,316.000	Dec. 1904	.24
Tonopah of Nev.	Nevada	1,000,000	1,000,000	1	1,600,000	Apr. 1906	.25
Tonopah Ext'nsion	Nevada	1,000,000	928,433	1	278,530	Apr. 1906	.15
Tonopah Midway	Nevada	1,000,000	1,000,000	1	150,000	Apr. 1906	.05
Uncle Sam,	Utah	500,000	500,000	1	105 000	May 1906	.01
United Cop. Com	Mont	75,000,000	450,000	100	3,075,000	Apr. 1906	1.75
United, c. pf	Mont	5 000,000	50 000	100	1,050,000	Nov. 1905	3.00
United, z. l., com	Mo.	5,000,000	92,400	5	27,450	Oct. 1903	.05
United, z. l., pf	Mo.	1,000,000	19,556	25	197,084	July 1905	.50
United, (Cripple C'k)	Colo.	5,000,000	4,009,100	1	280,071	Apr. 1905	.00½
United Verde, c.	Ariz	3,000,000	300,000	10	17,085,322	Dec. 1904	.75
Un. States,pf.s.s.c*.	Utah	37,500,000	750,000	50	656,250	Apr. 1906	.87½
Utah, g.	Utah	1,000,000	100,000	10	227,000	Apr. 1906	.01
Utah Con., c.	Utah	1,500,000	300,000	5	4,386,000	Jan. 1906	2.50
Victoria, Utah	Utah	250,000	250,000	1	47,000	May 1906	.05
Vindicator Con., g.	Colo.	1,500,000	1,500,000	1	1,425,000	Apr. 1906	.03
Wolverine, c.	Mich	1,500,000	60,000	25	2,910,000	Apr. 1906	8.00
Work, g	Colo.	1,500,000	1,500,000	1	15,000	May 1905	.00½
Yankee Con.	Utah	500,000	500,000	1	100 000	Aug. 1905	.05
Yellow Aster, g.	Cal	1,000,000	100,000	10	538,789	Feb. 1904	.15

*Previous to consolidation $1,436,250 were divided.

Coal, Iron and Other Industrials—United States.

Name of Company and Location.		Authorized Capital.	Shares. Issued.	Par Val. $	Dividends. Total to Date.	Latest. Date.	Amt.
Ala. Con., C. & I., pf.	Ala.	$2,500,000	24,638	100	$905,265	May 1905	$1.75
Allis-Chalmers, pf.	U. S.	25,000,000	200,000	100	3,213,750	Feb. 1904	1.75
Amer. Ag. Chem., pf.	U. S.	20,000,000	181,350	100	6,286,790	Apr. 1905	3.00
American Cement.	Pa.	2,000,000	200,000	10	888,000	Jan. 1906	.30
American Coal.	Md.	1,500,000	50,000	25	1,757,500	Mar. 1906	1.25
Associated Oil.	Cal.	21,000,000	21,000,000	1	630,000	Aug. 1905	.01½
Bethlehem Steel, pf.	Pa.	15,000,000	150,000	100	525,000	Feb. 1906	1.75
Bon Air C. & I., pf.	Tenn.	2,500,000	18,803	100	249,757	Oct. 1904	1.50
Cambria Steel.	Pa.	50,000,000	900,000	50	10,500,000	Jan. 1906	.75
Caribou Oil.	Cal.	100,000	80,000	1	56,000	July 1905	.07
Central C. & C., com.	Mo.	5,125,000	51,250	100	1,166,250	Oct. 1905	1.50
Central C. & C., pf.	Mo.	1,875,000	18,750	100	984,370	Oct. 1905	1.25
Central Oil	W. Va.	1,500,000	60,000	25	182,500	May 1904	.25
Claremont Oil.	Cal.	500,000	450,000	1	58,500	June 1905	.01
Col. & Hock. C. & I.	Ohio	7,000,000	69,244	100	173,086	Feb. 1905	.25
Consolidated Coal	Ill.	5,000,000	50,000	100	350,000	July 1904	1.00
Consolidation Coal.	Md.	10,250,000	102,500	100	7,971,650	Feb. 1906	6.00
Crucible Steel, pf.	Pa.	25,000,000	250,000	100	250,000	Dec. 1906	1.00
Empire S. & I., pf.	N. J.	5,000,000	23,700	1	535,500	Jan. 1906	1.50
Fairmont Coal,	W. Va.	12,000,000	120,000	100	840,000	Feb. 1906	2.00
Four Oil.	Cal.	500,000	300,000	1	105.406	July 1905	.01
General Chem. Com.	U. S.	12,500,000	74,103	100	1,448,713	Mar. 1906	2.00
General Chem., pf.	U. S.	12,500,000	100,000	100	3,925,178	Apr. 1906	1.50
George's C'k Coal	Md.	2,500,000	22,000	100	1,188,000	July 1904	3.00
Home Oil.	Cal.	100,000	100,000	1	507,500	Oct. 1904	.02½
Ill. Crude Oil	Cal.	200,000	200,000	1	12,500	Dec. 1904	.01½
Imperial Oil	Cal.	1,000,000	100,000	100	880,000	July 1905	.20
Int. Steam Pump, pf.	N. Y.	12,500,000	88,500	100	5,250,000	May 1906	1.50
Jeff. & Cl'f C. & I, cm	Pa.	1,500,000	15,000	100	330,000	Aug. 1905	5.00
Jeff. & Cl'f. C. & I.,pf.	Pa.	1,500,000	15,000	100	788,000	Feb. 1906	2.50
Kern River Oil.	Cal.	2,000,000	20,000	100	39,500	May 1905	.13
Lehigh Coal & Nav.	Pa.	14,345,650	346,897	50	23,533,303	Nov. 1905	2.00
Maryland Coal,pf.	Md.	2,000,000	18,850	100	1,367,160	Dec. 1905	4.50
Monon R. Coal, pf.	Pa.	10,000,000	100,000	100	3,154,945	Jan. 1906	.97
Monte Cristo Oil.	Cal.	500,000	500 000	1	120,000	July 1905	.01
National Carbon, pf.	U. S.	4,500,000	45,000	100	2,047,500	May 1905	1.75
National Lead, pf.	N. Y.	15,000,000	149,040	100	15,280,048	June 1906	1.75
Nat'l Steel & Wire,pf.	N. Y.	5,000,000	25,778	100	631,561	May 1906	1.75
New Central Coal	Md.	1,000,000	50,000	20	310,000	Nov. 1905	.40
Oil City Petroleum.	Cal.	500,000	500,000	1	55,000	July 1905	.00½
Pacific Coast Borax.	Cal.	2,000,000	19,000	100	2,086,500	Aug. 1905	1.00
Peerless Oil.	Cal.	1,000,000	92,000	10	396,320	May 1905	.14
Penna. Salt.	Pa.	3,000,000	60,000	50	13,988,000	Oct. 1905	3.00
Penna. Steel.	Pa.	25,000,000	168,214	100	5,849,497	Nov. 1905	3.50
Phila. Gas, com.	Pa.	28,953,029	579,061	50	6,684,142	Nov. 1905	.75
Phila. Gas, pf.	Pa.	5,744,813	114,896	50	1,583,505	Mar. 1905	1.25
Pittsburg Coal, pf.	Pa.	32,000,000	297,010	100	11,434,962	Apr. 1905	1.75
Pocahontas Coll., pf.	W. Va.	1,500,000	15,000	100	370,000	May 1906	1.50
Republic I. & S., pfd.	Ill.	25,000,000	204,169	100	1,840,014	May 1906	3.75
Sloss-Sheffield, com.	Ala.	7,500,000	75,000	100	375,250	Oct. 1905	2.50
Sloss-Sheffield, pf.	Ala.	20,000,000	67,000	100	2,674,000	Jan. 1906	1.75
Somerset Coal.	Pa.	4,000,000	40,000	100	80,000	Feb. 1904	2.00
Standard Oil.	U. S.	100,000,000	970,000	100	295,035,000	Mar. 1906	15.00
Tenn. C. & I., com.	Tenn.	22,553,600	225,536	100	2,004,281	Feb. 1906	1.00
Tenn. C. & I., pf.	Tenn.	248,000	2,480	100	360,250	Feb. 1906	2.00
Texas & Pacific Coal.	Texas.	2,000,000	20,000	100	1,930,000	Mar. 1905	2.00
Thirty-three Oil.	Cal.	500,000	100,000	5	430,000	July 1905	.10
Union Oil	Cal.	10,000,000	100,000	100	1,118,766	May 1905	.50
Union National Gas.	Pa.	9,000,000	90,000	100	1,260,000	Apr. 1905	2.00
U. S. SteelCorp.,cm.	U. S.	550,000,000	5,083,025	100	53,360,978	Dec. 1903	1.50
U. S. Steel Corp., pf.	U. S.	360,281,100	3,603,141	100	185,928,973	May 1906	1.75
Va. Carolina Ch., cm.	U. S.	38,000,000	279,844	100	3,678,829	June 1903	1.25
Va. Carolina Ch., pf.	U. S.	20,000,000	180,000	100	10,020,869	Jan. 1906	2.00
Westmoreland Coal.	Pa.	3,000,000	60,000	50	8,580,000	Oct. 1905	2.50

Canada, Mexico, Central and South America.

Name of Company and Location.		Authorized Capital.	Shares. Issued.	Par Val. $	Dividends. Total to Date.	Latest. Date.	Amt.
Amistad y Conc'rdia.	Mex.	$480,000	9,600	50	$258,064	Jan.' 1905	$1.71
Butters' Salvador, g.	Salv.	750,000	150,000	5	600,000	Apr. 1905	.25
Cariboo McKin'y, g.	B. C.	1,250,000	1,250,000	1	546,837	Feb. 1904	.04
Carmen, g. s.	Mex.	27,500	1,100	25	117,437	Jan. 1905	2.37
Copiapo, c.	Chile	1,125,000	112,500	10	3,000,900	Oct. 1904	1.20½
Crow's Nest Pass	B. C.	3,500,000	121,486	25	968,947	Apr. 1904	2.50
Dominion Coal, com.	N. S.	15,000,000	150,000	100	1,050,000	Dec. 1903	1.75
Dominion Coal, pf.	N. S.	3,000,000	30,000	100	3,330,000	Jan. 1905	4.00
Dos Estrellas. g. s.	Mex.	150,000	3,000	50	1,020,555	July 1905	13.65
El Oro, g. s.	Mex.	5,750,000	1,080,000	5	2,708,800	July 1904	.15
Esperanza, s. g.	Mex.	2,275,000	455,000	5	2,667,599	Jan. 1906	2.62½
Granby Con.	B. C.	13,363,030	1,336,303	10	938,621	May 1906	.30
Greene Con., copper.	Mex.	8,640,000	864,000	10	4,431,800	Apr. 1906	.40
Greene Con., gold.	Mex.	5,000,000	500,000	10	300,000	July 1905	.20
Guggenheim Exp'l.	Mex.	17,000,000	105,000	100	2,021,250	Jan. 1906	1.75
LeRoi No. 2, g.	B. C.	3,000,000	120,000	25	432,000	Oct. 1905	.24
Mexican Coal & Coke	Mex.	5,000,000	50,000	100	600,000	Dec. 1905	3.00
Mines Co. of Am.	Mex.	2,000,000	2,000,000	1	1,845,000	Feb. 1906	.18
N. Y. & Hond. Ros	C. A.	1,500,000	150,000	10	2,107,500	Feb. 1906	.20
North Star.	B. C.	1,500,000	1,300,000	1	351,000	Dec. 1904	1.00
N. S. St. & Coal, com.	N. S.	5,000,000	50,000	100	788,600	Nov. 1904	2.00
N. S. St. & Coal, pf.	N. S.	2,000,000	10,300	100	309,000	Apr. 1905	2.00
Penoles.	Mex.	.....	3,399,800	...	59,375	July 1905	23.75
Providence, g. s.	B. C.	200,000	40,000	5	22,224	Oct. 1904	.10
Reco, g. s.l.	B. C.	1,000,000	958,000	1	327,082	Apr. 1906	.02
Slocan Star.	B. C.	500,000	500,000	1	575,000	Dec. 1904	.05
St. John del Rey, g.	Brazil.	3,000,000	546,265	5	14,228,101	Dec. 1904	.12
St. Eugene Con.	B. C.	3,500,000	3,202,000	1	402,120	Oct. 1905	.02
Tezuitlan Copper	Mex.	1,000,000	10,000	100	.....	Apr. 1906	2.00
Tilt Cove, c.	N. F.	1,000,000	89,000	2	21,360	Jan. 1905	.24
Tyee, c.	B. C.	940,000	180,000	5	136,800	Dec. 1904	.48